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A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.

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SURGERY OF THE BRAIN AND NERVES.

BY N. SENN, M.D.,

MILWAUKEE.

I. INTRACRANIAL HEMORRHAGE.

MODERN surgeons, almost without exception, recognize trephining as a legitimate operation in the treatment of intracranial hemorrhage following a trauma where life is threatened from compression of the brain due to this cause. Intracranial hemorrhage from the middle meningeal artery must be looked upon as a positive indication for the use of the trephine, whether the skull is fractured or intact. Senger¹ has collected 66 recent cases of trephining for injuries of the skull, performed under strictest antiseptic precautions, and has shown that not in a single instance was death attributable to the operation; but that in all cases where death followed, it was due to the gravity of the trauma or complications which occurred independently of the operation. Such a statistic must certainly encourage surgeons to pursue a decided, energetic course in all cases of recent injury to the skull where life is imperiled by compression of the brain from hemorrhage, and where the seat of the extravasation can be located with sufficient accuracy to warrant a recourse to an operation.

Dr. Armstrong² reports the case of a negro, aged 53 years, who was struck on the left forehead by a brick, producing an irregular lacerated wound about half an inch above the external edge of the eyebrow. He was unconscious for a short time. When the patient was seen next morning no fracture could be detected. The wound, which was filled with particles of dirt, was cleansed and dressed antiseptically. It healed by granulation, and the patient suffered from no untoward symptoms until about seven weeks later, when he noticed while walking a tendency of the right foot to drag slightly. Ten days later, while eating, his head fell forward on the table, and his right arm and leg seemed paralyzed; the same morning he had a chill followed by fever. After this

time the right leg dragged a little more, and he would notice an occasional loss of control of the right leg and arm. On examination at this time, the muscles of face and tongue were not found affected; muscular power of hands same on both sides; in walking he dragged the right foot slightly. About two months after the injury, the paralysis of the lower extremity was more marked and the right arm was found more powerful than the left. In view of the progressive character of the lesion, which was diagnosed as a probable abscess of the brain, it was decided to operate. An ophthalmoscopic examination made at this time revealed optic neuritis on both sides. The patient was chloroformed, and under the usual antiseptic precautions the skull was exposed by a curved incision at a point corresponding to the middle frontal convolution. A button of bone was removed with Galt's trephine. No intracranial fracture was found. The dura-mater was dark colored and non-pulsating. The subdural space was explored with a hypodermic syringe and dark blood withdrawn. The dura was now incised and a large quantity of fluid blood was evacuated. Horse-hair drainage for dural wound. External wound approximated and covered with a thick layer of absorbent cotton. As the patient was somewhat collapsed after the operation, brandy was administered. The paralysis disappeared promptly and the patient recovered completely without any untoward symptoms. This case is interesting, as it shows that an injury to the skull may lacerate some of the intracranial vessels, and that when the vessel injured is not a large one and fails to undergo obliteration, secondary hemorrhage may occur and give rise to serious symptoms a long time after the injury has been inflicted. In this case the hemorrhage occurred at different times, each attack giving rise to an acute exacerbation of symptoms. Had the pathological conditions been understood at the time of operation, it would have been equally efficient and safer to remove the extravasation by aspiration after the removal of the button of bone,—a procedure which would have made the dural wound unnecessary, and would have admitted of immediate reimplantation of the entire bone disk and complete closure of the external wound.

Dr. Ceci,³ of Genua, observed a case of injury of the skull over right parietal region, where the patient recovered rapidly

without any manifestations of focal symptoms until two months later, when paraplegia supervened, followed by left hemiplegia and hypoglossal paralysis on right side. Diagnosis of abscess of the brain was made and the trephine was applied over the site of injury, when a subdural extravasation of blood was found and removed. The brain was explored and no pus was found. The patient recovered slowly, but completely.

Dr. Schneider,⁴ of Königsberg, has published an account of a case of punctured wound of the skull, followed by well-marked focal symptoms, in which he trephined and removed a subdural blood-clot from the lacerated middle cerebral artery, and cured his patient, a young man 18 years of age, who was stabbed with a knife in the left temple, and who had almost immediate paralysis of the right side of the face and of the right arm and leg. Four days afterward he was brought into the hospital at Königsberg. The wound was located over the third frontal convolution, and was almost healed. He was unconscious and could answer by signs, although he could not speak a word. He could and did write with his left hand with increasing facility for several days, although he had been right-handed before. As the paralysis increased without febrile symptoms, Schneider attributed it to an increasing accumulation of blood, and operated for its relief on the ninth day after the injury. He trephined the skull at the seat of the wound, opened the dura, removed a small clot, found the first branch of the middle cerebral artery spurting in the substance of the brain, seized it with forceps and ligated it with catgut. The wound was then cleansed and the opening in the dura sutured with catgut. The external wound was also sutured, drained and a Lister dressing applied. The wound healed by first intention. On the third day the patient began to articulate, and in four weeks his speech was perfect. Part of the hemiplegia disappeared more rapidly; the leg and arm recovered in eight days; but the facial paralysis was not wholly gone after a lapse of six months. The rapid subsidence of symptoms after the operation is positive proof that the focal symptoms, hemiplegia and facial paralysis, were due solely to compression caused by the blood-clot; and if this was the case, a certain interval must have elapsed between the time the injury was received and the appearance of the paralysis. Focal symptoms which follow immediately after an injury to the

skull are caused by an injury to the brain itself; and under such circumstances the surgeon would not be justified in resorting to operative measures, unless subsequent aggravation of symptoms would demonstrate the existence of an intracranial hemorrhage complicating the visceral injury.

In cases of intracranial hemorrhage, without a compound fracture of the skull, it is not always easy to find the bleeding vessel or even the blood-clot by trephining. During a period of 3 years Kroenlein⁷ trephined four closed skulls for the purpose of arresting hemorrhage from the middle meningeal artery; and two of his patients recovered, while the remaining two died because the extravasation was located posteriorly to the trephine openings and could not be found and removed at the time of operation. Kroenlein therefore recommends that in cases where the surgeon is reasonably certain that the symptoms of compression are due to hemorrhage, exploratory trephining be continued until the hæmatoma is found. In one case Thiersch had to remove three disks of bone with the trephine before the blood-clot was found.

II. ABSCESS OF THE BRAIN.

During the last few years a number of cases of deep-seated chronic abscess of the brain have been successfully treated by incision and drainage. In most instances a positive diagnosis was made before the operation, and where this was not possible the abscess was accurately located by making one or more exploratory punctures.

Dr. O. W. Maher⁸ reports a case of abscess of the brain following a compound fracture of the skull which terminated in complete recovery after incision and drainage. The patient was a girl, $4\frac{1}{2}$ years of age, who had sustained a severe compound fracture of the frontal bone on the right side. The removal of some necrosed portions of bone led subsequently to slight hernia cerebri. A sinus persisted; but the child seemed well in other respects until about five months after the accident, when left-sided convulsions, chiefly of the muscles of the face and arm, came on and an alarming condition rapidly developed. The sinus was opened up and a director was passed for a distance of one inch into the right frontal lobe downwards and backwards. A copious discharge of fetid pus occurred, and after irrigating the abscess cavity with a 1 in 40

solution of carbolic acid, a drainage-tube was inserted. The latter was removed at the end of a fortnight. Left hemiplegia followed the operation, but passed off some twenty-four hours later. Recovery was rapid and complete. In Weir's case⁷ the abscess also followed an old injury. The patient in 1880 received an injury of the left frontal region, just above the eyebrow, by his gun exploding and lodging its breech-pin in his brain. When it was removed at the hospital the anterior clinoid process of that side could be felt by the finger. A number of bone fragments were removed, together with some brain substance. No cerebral symptoms followed until four months later, when occasional epileptic convulsions appeared, which, however, ceased completely after a time. Later on he had a painful pulsating swelling over the site of the old injury, which passed away under treatment with large doses of iodide of potassium and local blistering. Some months after he began to have much pain and headache on the left side of the head over the eyebrow. When sent to the hospital by Dr. Seguin on November 7, 1886, there was some œdema of the left upper eyelid and marked tenderness over the region of the old cicatrix, with a feeling of deep fluctuation. No paralysis of motion or sensation. The patient being placed under the influence of ether, a V-shaped incision was made, the old scar being raised, when an opening in the skull the size of the thumb-nail was exposed: this was filled by a dense membrane which pulsated visibly. An exploratory puncture with a thoroughly disinfected hypodermic needle revealed the presence of pus, whereupon an incision was made and nearly two tea-spoonfuls of pus were evacuated. The abscess extended nearly an inch from the skull into the brain. It was first thought it might be the original frontal sinus; but its depth and the evident pulsation showed that it was within the cranial cavity, although shut off from the brain by a thick layer of inflammatory exudation. The cavity was packed with iodoform gauze. During the evacuation of the pus the patient's respiration ceased, and it was re-established only by resorting to artificial respiration, lowering the head, and administering whisky hypodermatically. This phenomenon had been previously observed by Nancrede in a similar case. Although the ultimate result of the case is not given on account of the shortness of the time which had intervened between the operation and the

report, we have every reason to believe that the patient made a good recovery.

Von Bergmann⁸ reports an exceedingly interesting case of abscess of the brain which followed a gunshot injury of the skull. The patient was a young man 19 years of age, who was hit by a revolver bullet in the right temporal region. He became unconscious immediately after the injury. The wound healed by primary union without a drop of pus, and the patient was discharged apparently well three weeks later. Three months after he became unconscious for a very short time, and this attack was followed by severe pain in the occipital region, stiffness of the neck and frequent vomiting. When he was readmitted into the hospital, June 6 of the same year, aside from these symptoms it was ascertained that his pulse varied from 40–50. He was somnolent, and the temperature of the right side of the body was 1° higher than on the left, while the temperature in the axilla was the same on both sides. These symptoms did not point with sufficient certainty to any particular part of the brain as the seat of inflammatory lesion until paresis of the left facial muscles supervened, and the left optic papilla was found in a congested condition. Probable diagnosis of abscess in the lower third of the right sulcus Rolando was made, and this locality corresponded with the traumatic lesion. It was decided to make at once an extensive trephining operation with the chisel. After three fruitless attempts to reach the abscess with the knife, the operation was abandoned and the wound filled with iodoform gauze. Three days later the dressing was found saturated with a large quantity of pus which had discharged itself spontaneously from the interior of the brain. After this occurrence the pulse increased to 60, and the headache and somnolency disappeared. Two days later another and smaller abscess was evacuated and drained. The patient died, and at the post-mortem a third abscess was found. It is to be regretted that in this case the focal symptoms were relied upon too much in locating the abscess, and that the use of the knife was not preceded by the methodical use of an exploratory needle.

Another case of abscess of the brain following a trauma is reported by Wilson.⁹ The patient was a boy, 11 years of age, who while snowballing, in January, 1887, fell, striking his head on a railroad coupling-pin. He was unconscious only for a short

time. When examined a scalp wound one-third of an inch in length, penetrating to the bone, was found on the right side of the head, two and one-quarter inches above the outer orbital angle, one and three-quarter inches to the right of the median line, and one and three-quarter inches in front of the coronal suture. The bleeding, which had been quite free, was arrested by the application of cold. No injury of the skull could be detected. The boy appeared quite well until ten days after the injury, when he became quite ill and five days later complained of chills and severe headache, and obstinate vomiting for a number of days. A week after the vomiting commenced the pulse rate had fallen to 40, and a week later it rose to 70-80, at which it remained. At this time the headache, which had been continuous, became intermittent and excruciating. About four weeks after the commencement of the disease, convulsions set in, at first five or six a day, gradually diminishing in number to two or three a week, until about July 1st, when they again became more frequent and severe. They were followed by paralysis of the right arm and loss of power in both legs; but these symptoms disappeared about the first of June, up to which time the boy had been confined to bed. After this time he was able to walk about, but would fall suddenly when convulsive attacks came on, and his gait was awkward at all times. After vomiting ceased the appetite became voracious, and a great increase in flesh followed. The abdomen became enlarged and the face lost expression. On the 1st day of July he was examined by Dr. Baird, who noted the following conditions: The face was slightly drawn to the left; right eye totally blind, and vision of left much impaired; both pupils dilated; a slight convergent strabismus; noises and impaired hearing in right ear; complete loss of sense of smell; tongue partially paralyzed, but sense of taste unimpaired; urine scanty, sleep disturbed, speech slow, memory good; some mental dullness. As the focal symptoms pointed to a lesion in the brain at the site of injury, an operation appeared to offer the only chance for recovery. The skull was consequently opened with the trephine at the site of the original injury. The cicatrix in the skin was somewhat depressed and tender on pressure. On reflecting the soft parts the external table presented no evidences of injury, except a perforation sufficient to admit a small probe, which extended through

the entire thickness of the bone. On removing the disk of bone no change was observed on its external surface except the small perforation mentioned. The dura-mater was tense and bulged into the opening, and when incised with a bistoury fully three ounces of pus escaped in a jet. A drainage tube was introduced and the scalp-wound sutured. The discharge was free for several days, when the tube was removed and the wound healed promptly except at one point where a small fistulous opening remained for a time, occasionally discharging small quantities of serous fluid. It closed permanently in about a month. Rapid improvement followed the operation and, with the exception of a slight strabismus, he recovered completely. Although this case is reported as a cerebral abscess, some doubt must exist as to the primary location of the suppurative process. From the character of the injury and the clinical history of the case it is more than probable that the abscess followed a suppurative pachymeningitis, or a superficial suppurative encephalitis, and consequently it would be more proper from a pathological and especially from a surgical standpoint to call it a subdural abscess.

A number of cases of abscess of the brain following suppurative inflammation of the middle ear or the mastoid process of the temporal bone, have recently been subjected to successful surgical treatment.

Mr. Barker¹⁰ in a very able and practical paper treats of the pathological conditions which precede the formation of abscess from such causes. Abscesses appear to be produced in two different ways, of which it is hard to say which is the commonest. In the first place, we find a septic phlebitis extending from the walls of the tympanic cavity into the substance of the brain by a longer or shorter route, and there setting up an inflammatory process in the white substance. Here the dura-mater of the petrous bone may show but few signs of disease, and the serous covering of the encephalon be perfectly normal to the naked eye. There may even be a considerable thickness of sound cortical brain-tissue between the arachnoid and the cavity of the abscess. The course of the veins along which the inflammation extends is liable to considerable variation. In the case of the brain; they usually pass from about the middle of the temporo-sphenoidal lobe either into the superior petrosal sinus, to the dura-mater above the roof

of the tympanum, or to the petroso-squamosal suture. The abscess in the brain consequently is set up by a "retrograde phlebitis." The next mode of origin is that of simple extension of the inflammation from the middle ear to the dura-mater, and from this to the cortex of the brain directly through the medium of a more or less localized septic leptomeningitis. The first mode of origin is, I think, more often met with in the case of the cerebellum; the last in that of the brain. Both may start from the same form of inflammation in the middle ear, with or without caries of its walls, and with or without subdural abscess. It is obvious that the last mode of origin is associated with the gravest local condition. In the first place, septic meningitis has a great tendency to become general; and next, such an inflammation can hardly spread backwards towards the cerebellum without involving the lateral sinus and producing more or less septic phlebitis in it, with or without general pyæmic infection. Moreover, subdural abscess may produce grave symptoms. He enumerates five distinct pathological conditions as being produced from the same primary seat of suppuration: (1) general septic meningitis; (2) plastic phlebitis of the sinuses; (3) pyæmia, generally associated with phlebitis of the sinuses; (4) abscess of the cerebellum; and (5) abscess of the cerebrum.

The practical deductions to be drawn from this classification of secondary pathological conditions are obvious, as it can be readily seen that operations performed for the relief of abscess of the brain or cerebrum, when this condition is complicated by a diffuse septic leptomeningitis, would be an almost hopeless undertaking. In regard to location of cerebral abscess following a purulent inflammation of the temporal bone, he believes that nine-tenths of them would be found to lie within a circle with a three-quarter-inch radius, whose center lay an inch and a quarter above, and the same distance behind, the center of the bony meatus of the ear. This might be described as the dangerous area; and as it fortunately includes the spot indicated as most likely to be the seat of subdural abscess, from the same cause, an exploration for the latter would be a necessary preliminary to a trephining operation for cerebral abscess. According to his observations, abscess in the cerebellum due to the same causes is always found at the outer and anterior part of the lateral lobe which rests against the petrous

bone. He also calls special attention to the subnormal temperature in these cases, which becomes particularly well marked toward evening,—the time when in suppurative inflammations in other localities an almost constant rise in temperature is observed.

Another important symptom frequently observed in cerebral abscess is alluded to, viz., *sluggish but perfect cerebration*. When asked a question, for instance, the patient appeared to take no notice for several seconds, until one thought he could not have heard, or had forgotten that he had been addressed. Presently, however, he would begin to answer slowly and deliberately, but with perfect intelligence. It was the same with his movements.

There can no longer be any difference of opinion in regard to the immediate cause of the secondary purulent inflammatory processes which occur in the brain and its envelopes in the course of a purulent otitis media, or suppurative osteomyelitis in any portion of the temporal bone, since recent research and experimentation have associated all purulent processes with a definite specific cause,—the pus-microbes. The inexplicable part consists in the various types that the secondary inflammatory processes may assume under the influence of the same cause. The staphylococcus pyogenes aureus and albus which ordinarily produce a circumscribed suppuration, may, from as yet unknown reasons, produce a diffuse septic inflammation manifesting no tendency to localization, as in cases of purulent septic leptomeningitis, resembling in this respect the streptococcus pyogenes and the streptococcus of Fehleisen. It is possible that the histological structure of the tissue, the seat of the inflammation, may be in part, at least, answerable for such an unusual pathological course. The dissemination of the essential cause from the primary depot takes place either by continuity of tissue, a direct extension of the purulent inflammation, or through the medium of blood-vessels when metastatic abscesses form in the interior of the substance of the brain, where, between the abscess and the primary seat of suppuration, apparently healthy brain-tissue is interposed. From an operative standpoint these cases often present insurmountable difficulties, as multiple metastatic abscesses may exist, so that incision and drainage of one abscess may not be followed by cessation of the urgent symptoms. The surgeon in such cases must be on his guard, and if the operative treatment is not followed by the desired result, make diligent

search for an additional abscess in the dangerous area. For the purpose of furnishing the readers with an accurate clinical observation of a case of cerebral abscess following suppurative inflammation of the middle ear, and to familiarize them with the pathological conditions, the following case described by Dr. Gairdner,¹¹ of Glasgow, will answer a useful purpose:—

A barber, 54 years of age, was admitted into Western Infirmary under Dr. Gairdner, December 15, 1886. From his wife it was ascertained that he had never been sick, and that his only infirmity had been deafness, and there were discrepancies in the statements as to the existence or not of a discharge from the left ear previous to the present illness; but he had been under the care of several physicians for about five years on account of deafness. The last occasion on which he took medical advice was the only one on which even any suspicion of cerebral disorder could be ascertained. Three weeks before admission he suffered considerably from a pain in the left ear, but confined to the ear. December 4th a cartilaginous growth was removed from the meatus of the left ear, and on the 5th a tooth was drawn, both of the operations being done for the relief of pain, and apparently without any difficulty, but also without any sense of relief. The pain extended to the occiput and afterwards to the whole head, blisters being twice applied for the same. His intelligence remained unimpaired until three days prior to his admission, and up to this time vomiting, convulsions and paralysis were absent. Three days before admission he became worse and somewhat delirious, and from this time onward a lethargic stupor, deepening into coma, seems to have been the only indication of progressive cerebral disease. Fever was inconsiderable, and even after admission the temperature on two occasions was found to be normal; but on the 21st there was a sudden rise to $105^{\circ}.2$ at 1.20 A.M., and until his death at 5.35 A.M., high temperatures were maintained. Unconsciousness, with stertorous breathing, as in apoplexy, was complete for five or six hours before death; but although during the period of observation every possible attention was given to the details, no facts tending to localize the lesion were observed; no paralysis of any kind, nor abnormal movements of the limbs, nor of speech, although at the first examination he was able, in a kind of somnolent, lethargic fashion, to walk about when desired to do so, and

even to utter a few words in response to questions. The *tache cérébrale* was present; the respiration was calm and natural up to within a few hours of death. The urine had to be drawn with catheter for three days. On admission the pulse was 58 and had no peculiarity of character. Death occurred on the 21st of December. Post-mortem the next day. On exposing the brain the left hemisphere is seen to bulge considerably as compared with the right; veins hyperæmic. The inferior surface of the left temporo-sphenoidal lobe is adherent over a small area to the dura-mater, and in removing the brain this adhesion is torn through, and simultaneously an abscess in the brain is laid open, from which escapes a quantity of thick, flocculent, and very fætid pus. At the place of adhesion this abscess is close to the surface, so that there is only a thin layer of white matter overlaid with red between the cavity and the surface. The neighboring brain substance is much undermined, and has a dark, bluish color. The abscess measures about $1\frac{3}{8}$ inches from before backwards, and $1\frac{1}{8}$ inches transversely; it is lined with a distinct yellow layer, whose internal surface is irregular and flocculent. The abscess is situated in the left temporo-sphenoidal lobe, its middle point corresponding with the place of the adhesion, being $2\frac{1}{2}$ inches from the anterior extremity of the lobe. The superior temporo-sphenoidal convolution is not engaged, but the middle and inferior convolutions are largely undermined. There is pus in the subarachnoid space, over the inferior surface of the cerebellum and over the optic chiasma, extending slightly into the fissure of Sylvius on both sides, but especially on the right. The dura-mater presents a perforation, with shreddy irregular margins, opposite the point of adhesion to the brain. The bone beneath is irregular and covered with a semipurulent flocculent matter, which extends over a considerable area nearly as large as the upper surface of the petrous bone. At the internal margin of this area there is a perforation of the bone, just in front of the superior semicircular canal; and a probe introduced here passes out freely at the external meatus.

Examination of the auditory canal revealed the presence of a fibrous polypus springing from the posterior-wall and a carious opening communicating with the antrum of the mastoid process. Two carious apertures were also seen on the upper surface of the pars petrosa.—one through the roof of the tympanum and the other

through the roof of the antrum. In this case the extension was direct through the bone and the meninges to the brain, and is remarkable from the absence of focal symptoms with such extensive implication of the brain and its envelopes. It teaches an important lesson that in cases of grave cerebral disturbances in the course of suppurative affections of the internal ear, the surgeon is not to postpone operative procedures until focal symptoms present themselves.

Schede and Truckenbrodt¹² report the following successful case of operation for abscess of the brain following suppurative inflammation of the middle ear. The patient had suffered for some time from a purulent discharge from the left middle ear when the disease extended to the mastoid process of the temporal bone, which on account of the severity of the pain made an operation necessary. The mastoid process was opened behind the external meatus with a chisel, but the pain continued and the œdema increased. The focal symptoms which followed were aphasia and paralysis of the right facial nerve. It was concluded to perform another operation, although the diagnosis was not clear. The original opening in the mastoid process was enlarged, and after considerable difficulty an abscess the size of a small orange was found, incised and drained. The discharge from the wound remained profuse and fetid for some time. Four months after the operation, the patient was discharged from the hospital cured.

During my visit to Glasgow last spring I was shown a case of cerebral abscess, following ear disease, by Macewen, which was progressing favorably some time after the operation.¹³ The patient was a boy about seven years of age, who had suffered for some time from purulent inflammation of the middle ear, with perforation of the tympanum. A number of weeks before cerebral symptoms appeared, and the mastoid process had been opened by another surgeon without benefit. When the boy came under the observation of Dr. Macewen he showed distinct signs of mental perturbation; the pulse was slow, and the temperature subnormal. The only focal symptom was a slight ptosis on the affected side. From the history of the case and the complexus of cerebral symptoms it was concluded that the patient was suffering from a cerebral abscess. The head was shaved and thoroughly disinfected, and the trephine applied at a point about an inch above and an

inch behind the external meatus. When the disk of bone was removed the dura presented a normal appearance, but was quite tense and bulged somewhat into the trephine opening. No cerebral pulsation could be seen or felt. A thoroughly disinfected hypodermic needle was inserted and passed in a downward and forward direction toward the petrous portion of the temporal bone, the supposed seat of the abscess. About an inch from the surface pus was found. The abscess was incised and about an ounce of cream-colored pus escaped. For the purpose of securing more efficient drainage, a very small trephine was applied over the former site of operation, and an opening made in the floor of the abscess through the brain substance. The middle ear, the primary seat of suppuration, was thoroughly scraped out with a Volkman spoon and thoroughly disinfected. The first trephine opening was closed with bone chips from the disk removed, an aperture sufficiently large being left for the drainage-tube. Another drain was introduced from below, thus securing efficient, thorough drainage. An antiseptic occlusion-dressing finished the operation. The effect of the operation was marvelous. The stupor disappeared promptly and perfect consciousness was restored in a few days. The discharge was slight, and the boy was seen running about and playing, with nothing to indicate the gravity of the former lesion. The defect in the skull was almost completely closed by bone, only a slight depression indicating the location of the opening made by the trephine.

Gowers and Barker¹¹ report another case of cerebral abscess successfully treated by operation, where the abscess was not located by focal symptoms, but by methodical exploration. The patient was 19 years of age, and contracted a suppurative inflammation of the middle ear during an attack of scarlet fever. The inflammation extended to the mastoid process and caused grave general symptoms, for which the mastoid process was trephined, giving exit to fetid pus. As the symptoms did not subside it was believed that the abscess was located in the temporo-sphenoidal lobe. After removal of bone over this region the dura-mater and pia were seen to appear healthy, and an aspirating needle was inserted for half an inch in the direction of the roof of the pyramid, and $4\frac{1}{2}$ drachms of fetid pus removed. The wound in the brain was enlarged with a Volkmann spoon; abscess drained; complete recovery.

The example of Macewen in scraping out and thoroughly disinfecting the middle ear when this has become hopelessly destroyed by the primary purulent inflammation, should be more generally followed in operating for cerebral abscess traceable to this cause, as such a measure is well calculated to protect the patient against subsequent infection. The foregoing cases furnish abundant proof of the utility, as a life-saving operation, of timely surgical interference in all cases where well-defined cerebral symptoms point to the extension of the purulent process from the ear to the brain or its meninges, even when well-marked focal symptoms are absent, as an exploratory operation under strict antiseptic precautions would not constitute a source of danger; and if pus is found, early incision, drainage, and disinfection may often succeed in saving a life that under any other form of treatment would be hopelessly lost.

III. OPERATIVE TREATMENT OF TUMORS OF THE BRAIN.

As the removal of an endocranial tumor by operative procedure constitutes one of the most recent achievements of cerebral surgery, it is important to place at the head of this portion of the paper a brief description of the technique of such operations as laid down by Mr. Horsley.¹⁵

Preparation of the Patient.—The day before the operation, the patient's head is shaved and washed with soft soap and then ether; next the position of the lesion is ascertained by measurement and marked on the scalp. The head is then covered with lint, soaked in 1 in 20 solution of carbolic acid, oiled silk and cotton wool, being thus thoroughly carbolized for at least twelve hours before operation. Finally, the patient has the usual purgative administered the evening before, followed by an enema on the morning of the operation.

Anæsthetic.—The method of narcotizing the patient is most important, and consists of the administration by hypodermic injection of a quarter of a grain of morphine, after which the patient is chloroformed. The object of giving the morphine is twofold. In the first place, as is well known, it allows of the performance of a prolonged operation, without the necessity of giving a large amount of chloroform. In fact, the amount actually used in an operation lasting two hours I have found to be very small. The

second reason for employing the morphine is perhaps the more important, since it is based upon the fact determined by Professor Shafer and myself from experiments on monkeys, namely, that this drug causes well-marked contraction of the arterioles of the central nervous system, and that consequently an incision into the brain is accompanied by a very little oozing if the patient be under its influence. I have not employed ether in operations upon man, fearing that it would tend to cause cerebral excitement. Chloroform of course produces, on the contrary, well-marked depression.

Treatment of the Wound.—I consider that, in view of the fact that almost all methods have disadvantages which entail great responsibility on the surgeon, the safest is strict Listerian, meaning by that expression the use of the carbolic spray, 1 in 20 carbolic lotion, and, for the first few days at any rate, dressings of carbolic gauze. I need hardly say that the use of sublimate wool, the skin being protected by carbolic gauze or other slight modifications, may prove more serviceable; but good carbolic gauze is quite elastic enough to obtain the best results.

Line of Incision.—It is generally the custom to remove the soft parts from the cranium by means of a crucial incision. This form of incision is objected to as it necessitates the holding back of four flaps by several assistants. A semilunar flap is recommended which can be simply thrown back and requires no more holding. The incision must be carried vertically to the bone, and all parts superficial to the periosteum raised with the flaps. The curve must be a shallow one to avoid cutting collateral vessels. The main arterial trunk in that portion of the scalp should be avoided. The periosteum should be reflected by a crucial incision from an area corresponding to the first trephine hole, and increased consequently as more bone is cut away.

Removal of the Bone.—At this step of the operation it is advised to remove two disks of bone with the trephine at the opposite extremities of the area to be removed, then to half cut through the sides of such an area with a Hey saw, and finally to complete the division with powerful bone-forceps. For exploratory purposes a trephine two inches in diameter is recommended. Where it is possible to preserve the dura-mater intact the portions of the bone removed should be preserved in warm aseptic sponges, and at the end of the operation should be placed between the

skin and dura-mater, having previously been divided into small fragments after the manner indicated by Dr. Macewen.

Treatment of the Dura-Mater.—The dura-mater should be incised round four-fifths of the circumference of the area exposed at one-eighth distance from the edge of the bone, so as to render it possible to stitch the edges together afterward. The dura-mater is best opened first by incision with the scalpel, and then by blunt-pointed curved scissors, great care being taken not to wound the meninges beneath. The main branches of the middle meningeal artery are best secured by a ligature passed through the dura-mater just outside its cut edge, and tied before the vessel is divided.

Treatment of the Brain.—The first practical point to notice after the division of the dura is whether the brain bulges into the trephine opening or not. Bulging of the brain Horsley regards as an indication of the existence of pathological intracranial tension,—a piece of evidence which, if true, is obviously of the highest importance, since, other things being equal, it will indicate the existence of a tumor. In three cases of tumor of the brain which came under his observation this symptom was always present. If nothing obviously abnormal presents itself in the membranes, the next point on systematic observation of the brain is its color. Experience alone will give adequate familiarity with the appearance of the living brain and consequently warrant any one giving a decided opinion on the subject. Great stress is laid on this point, since the existence of a slight yellowish tinge, or possibly the contrary condition, lividity, will indicate the existence of a tumor beneath the cortex in the corona radiata. The condition of the vessels and the perivascular lymphatics must next be examined, and particular note taken of any yellowish white patches in the walls of the latter, indicating old mischief. Alterations in the density of the brain must next be observed; but it must be remembered that cerebral tumors situated beneath the cortex are scarcely to be detected save by exploratory incision. The examination of the brain exposed being supposed to be completed, the next point to consider is the mode of removal of a portion of the brain or tumor. Perhaps, considering the terminal character of the cerebral arteries, it is scarcely necessary to urge that, where possible, every main vessel should be left intact; but

as these vessels run in the pia-mater they can be raised from the brain, and especially out of the sulci, so as to allow of the subjacent brain being removed, while at the same time the vessel wall is so little injured that any resultant thrombosis will be of a very temporary nature. Further, in incising the brain, the cuts in the cortex must be made exactly vertical to the surface and directed into the corona radiata where necessary, in such a manner as to avoid damage of the fibres coming from the portion of the cortex and surrounding the seat of operation. This of course, is easily done by remembering the paths taken by the fibres from the cortex to the internal capsule. A portion of brain removed, whether normal or abnormal, does not leave, as might have been supposed, a permanent gap with vertical sides; for, even in a very short time, the floor of the pit, that is the corona radiata, bulges almost to a level with the surrounding cortex. In addition, the cut edges become slightly everted, and if less brain than bone is removed they are extruded into the opening of the skull. Hernia cerebri can only occur if the external wound fails to close by primary union, and if the wound becomes the seat of suppuration. The advantage of raising a flap of scalp which can be laid down again like the lid of a box, will now become obvious, since being continuous throughout it offers plenty of resistance to the brain pressure, which the point of meeting of four cross-cuts can never do,—this, indeed, on the contrary favoring the very thing one wishes to avoid. The principal resistance to this hernial protrusion of the normal brain is of course supplied in other ways.

Closure of the Wound.—All oozing, etc., having been arrested by gentle pressure with a soft sponge, the flap must be laid down and secured with medium-sized silk sutures at distances of one centimeter and between these, horse-hairs. During the first twenty-four hours there is a steady oozing of blood and serous fluid from the cut surfaces. This is best removed, and therefore a drain is introduced into the most dependent portion of the wound. The drainage-tube is to be removed the next day and the wound carefully dressed, firm but gentle pressure being made over the center of the flap. If the wound exudation that subsequently collects in the cavity accumulates to any appreciable extent, on the third day the patient may complain of some pain and throbbing in the wound which, when exposed, will be found distended in the center, the

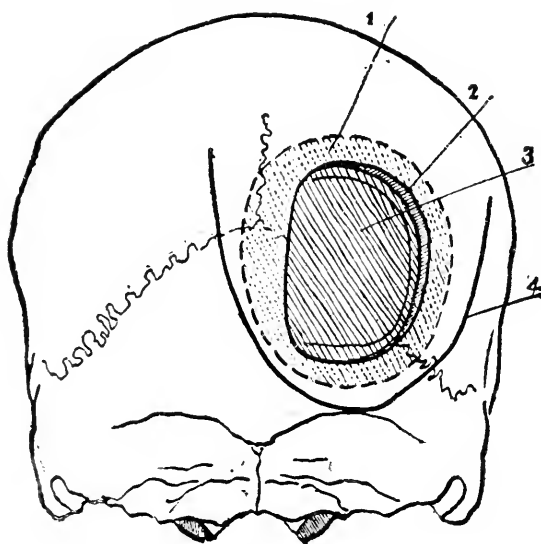
periphery being firmly united. Now comes a most difficult point in the treatment, namely, the question whether the tension is to be allowed to proceed, or whether it should be released. By adopting the latter measure the advantages of pressure will be lost, so that the point in question is one requiring special attention. The practical feature upon which it is to be decided is the very simple one whether the primary union is in danger of being broken down by the pressure or not. If the former is the case, the pressure can easily be diminished by gently opening up the track of the drainage-tube with a probe and liberating the exudation. As a general rule it will never be necessary to do more than relieve the tension in the wound once. At the end of a week or five days the wound may be lightly covered with a little powdered boracic acid, cotton wool and collodion, and the stitches may be removed at any time after the first week. It will always be found that the scalp tends to fall in a little at the seat of operation; but if the foregoing directions have been faithfully followed out, the depression will be slight. In opening the skull Mr. Horsley (as is the case with nearly all English and Scotch surgeons) depends mostly on the trephine, while the majority of German surgeons prefer the chisel. There can be no doubt that in the hands of a careful operator the chisel would prove a more precise and safer instrument, and should be preferred to the trephine in the elevation of a recent depressed fracture, as well as in opening the intact skull.

The following exceedingly interesting case is reported by Birdsall and Weir,¹⁶ and although the patient died nine hours after the operation from faulty hæmostasis, it presents so many points of interest that it deserves to be carefully read. The case is described by Birdsall, but the operation was performed by Weir. The patient was a Hebrew, 42 years of age, who came under the reporter's observation October 16, 1886. Until the summer of 1885 he had always been healthy, and denied ever having had any form of venereal disease or injury to the head. In August, 1885, after a sea-bath, he observed, for the first time, unsteadiness of gait, and had a severe attack of vomiting. Soon after, diplopia for distance, and increased awkwardness in walking were observed. and about the same time a disagreeable sensation, akin to numbness, in the right leg, hand and shoulder, but not in the face. This and the double vision were transitory. Headache, usually

frontal, was present occasionally, but was never severe. Vertigo, or tendency in a definite direction, was not noticed at this time. No other sensory, motor or visceral symptoms appeared. He was observed to miss objects when told to pick them up. This was probably due to the diplopia. All kinds of diagnosis, except the correct one, were made at different times and by different physicians who treated him. During the month of October, 1885, he came under the care of Dr. Seguin, who after a most careful examination made a correct diagnosis, and recognized the important localizing symptom,—hemianopsia. About this time a neuro-retinitis was discovered, and this condition was verified a few days later by Dr. Gruening, who determined the extent of his visual field, as shown by the accompanying chart. Diagnosis made November, 1885: Tumor of mesial aspect of right occipital lobe, involving primarily the cuneus, extending downward toward the tentorium cerebelli, and perhaps also upward toward the paracentral lobule (leg centre). During this period the patient was treated with large and increasing doses of potassium iodide. From January to July of the following year his diplopia disappeared, and his gait improved somewhat, though he had two attacks in which he suddenly, while walking in the street, felt that he could proceed no farther, and at the same time had a strong tendency toward the left and actually staggered to the left, so that his wife was obliged to support him. From July to September he remained in about the same condition, from which time on his difficulty in rising, standing and walking, together with drowsiness, rapidly increased. When examined by Dr. Birdsall in October, 1886, left lateral hemianopsia was present. The ophthalmoscope revealed double optic neuritis, most marked in the left eye. Iris active to light and accommodation; the left pupil somewhat larger than the right; no diplopia; no ocular paresis; smell, taste, hearing and speech normal; no word deafness or word blindness; no anæsthesia, analgesia, or disturbance of temperature sense in any part of the body. No paresis in muscles of face, trunk or extremities; no well-marked symptoms of ataxia. Uncertainty of control seemed to be the best expression for his slow and uncertain gait and his clumsy movements. Patellar reflexes unimpaired. There was no tenderness to pressure, or pain on percussion of any part of the head. The symptom of left hemianopsia could only be accounted for by a

Diagram of Visual Paths, designed to illustrate specially Left Lateral Hemianopsia from any lesion. L. T. F., left temporal half-field. R. N. F., right nasal half-field. O. S., oculus sinister. O. D., oculus dexter. N. T., nasal and temporal halves of retinae. N. O. S., nervus opticus sin. N. O. D., nervus opticus dext. F. C. S., fasciculus cruciatus sin. F. L. D., fasciculus lateralis dext. C., chiasma, or decussation of fasciculi cruciati. T. O. D., tractus opticus dext. C. G. L., corpus geniculatum laterale. L. O., lobi optici (corpus quad.) P. O. C., primary optic centres, including lobus opticus, corp. genic. lat., and pulvinar of one side. F. O., fasciculus opticus (Gratiolet) in the internal capsule. C. P., cornu posterior. G. A., region of gyrus angularis. L. O. S., lobus occip. sin. L. O. D., lobus occip. dext. Cu., cuneus and subjacent gyri constituting the cortical visual centre in man. The heavy or shaded lines represent parts connected with the right halves of both retinae.—(*Medical News.*)

After this time no new symptoms developed, except that the right patellar tendon reflex became somewhat greater than the left. His disturbance of equilibrium continued to increase in a very irregular manner. His intellect was not impaired, and his family observed no change in his character or disposition. On February 17, 1887, he was seen by Dr. Seguin in consultation, who proposed an exploratory operation by trephining over the neighborhood of the cuneus, and if found accessible to remove the neoplasm. Dr. Weir consented to undertake the operation, which was performed March 9, 1887, at the New York Hospital. The bowels were

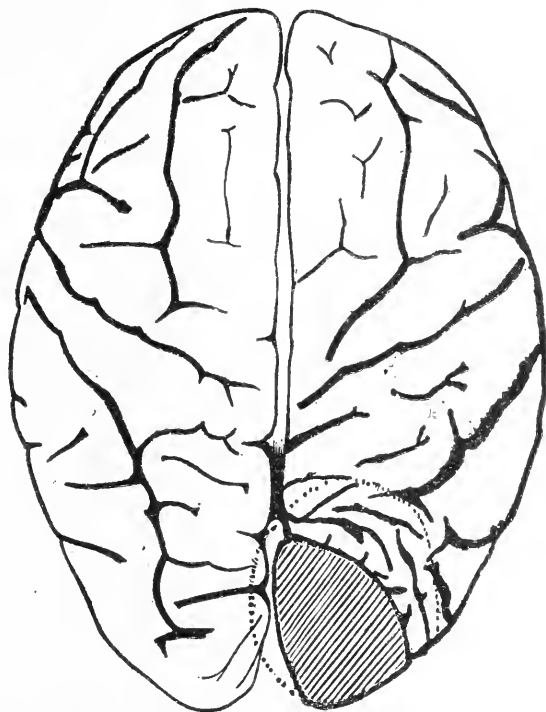


FIELD OF OPERATION.

1. Extension of tumor at its deepest part. 2. Opening in the skull ($2\frac{3}{4} \times 2\frac{1}{4}$ inches).
3. Flap of dura turned toward the median line. 4. Flap of the scalp.—(*Medical News*.)

moved by a saline cathartic the morning of the operation. The head was shaved and the scalp washed with green soap and water and then with ether, and subsequently covered for several hours with carbolic cloths wrung out of 1-30 solution and by gutta-percha tissue, all secured in situ by a bandage. The bregma, Rolanderic, and median lines having been marked out, and the occipital protuberance with some difficulty identified, and after the patient had had a hypodermatic injection of a quarter of a grain of morphia and had been etherized, an U-shaped flap, three inches long and three inches wide, with base upward, was made under a

carbolic spray 1-30, so as to straddle irregularly the median line in its lesser part, the greater part being over the right posterior cerebral lobe. The bleeding was free from this and from the thick periosteum, and also from the skull itself. At one inch above the occipital protuberance, and the same distance from the median line,—in other words, beyond the limits of both the longitudinal and lateral sinuses,—the circumference of a one-inch trephine was placed, and the bone, which was rather thin, cut through. A

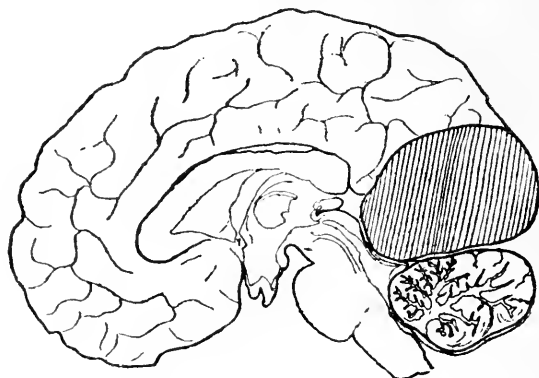


TUMOR SEEN FROM ABOVE.

The heavy shading shows the presenting part of the tumor when the dural flap was raised. The dotted line gives the maximum size of the tumor on a deeper level.—(*Medical News*.)

second button was removed immediately above the first and the intervening bridge gnawed away by a rongeur forceps. The edge of this opening was further enlarged laterally, with the same instrument, until an oval opening measuring two and three-quarters by two and a quarter inches was made. The dura-mater, non-pulsating, rose tensely in the space and was of a deeper hue than normal. This membrane was divided for two-thirds of the extent of the bone-opening, its retained attachment being toward the

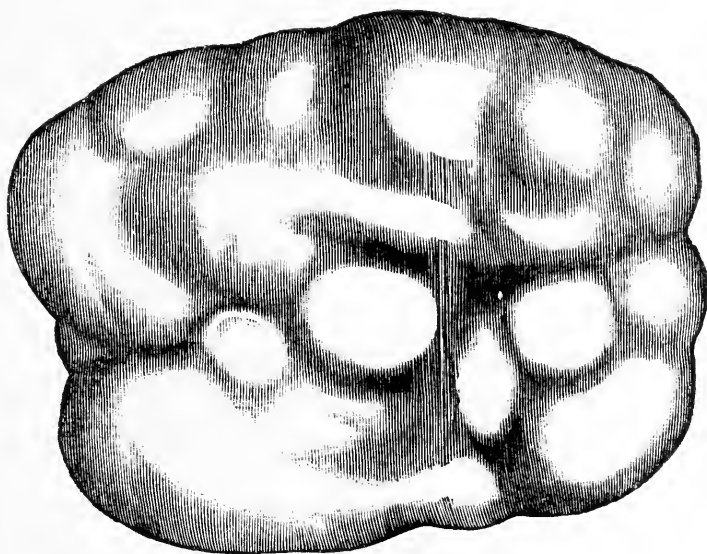
median line, so as to avoid encroaching on the longitudinal sinus. As it was cut and turned back, what was at first taken for brain, but was immediately recognized as the tumor, at once rose into the opening. It was of a purplish-red color like kidney structure, and was covered by a thin cellular tissue with large veins ramifying through it. With a director and the edge of a spoon-handle, a thin yellowish layer of flattened-out expanded brain tissue was loosened from the tumor on its outer side, and in this direction the enucleation was accomplished to a depth of nearly an inch. Similarly proceeding, but without seeing any further brain tissue, the tumor was loosened on all sides. Additional room was obtained for manipulation, by cutting away freely of the cranium externally, but all was insufficient to obtain access to the outlying



VERTICAL SECTION SHOWING TUMOR.—(*Medical News*.)

edges and base of the growth. The tumor was therefore incised and some of its softened, granular and fatty looking contents forced out. This somewhat diminished its size and enabled the forefinger to be passed between the cranium and the tumor; and by its aid, the delicate cellular attachments that held the mass in place were felt to yield easily, enucleation became possible, and the base was finally reached. By extracting the tumor with the finger, it was torn nearly completely in two, its outer part lifted out, and then the inner half, with the help of the finger-end and nail, separated from the falx and withdrawn. Free venous bleeding took place from the immense cavity left by the removal of the tumor. This was arrested by packing the cavity with four sponges and applying pressure. After a few minutes

they were removed and the cavity inspected by the light of a small electric light, revealing the immense compression of brain tissue that had taken place, the falx being crowded over toward the left beyond the median line and the tentorium depressed to a horizontal line. The tumor itself told the story better; for it weighed, as was afterward learned, 140 grammes, or $5\frac{1}{4}$ ounces, and measured three and a quarter inches by two and three quarters, and was two and a half inches thick. As the hollowed-out brain was lifted up by a retractor two bleeding points were seen, one being in the region of the straight sinus, though not free enough for that vein, and



TUMOR SEEN FROM ITS BASE: ACTUAL SIZE.—(*Medical News.*)

probably belonging to the pedicle of the growth, and the other apparently arterial, and possibly from a terminal branch of the posterior cerebral artery. The flow from each was readily checked by direct pressure, and it was determined to control them by packing the cavity with iodoform gauze. This was done not too firmly, it being assumed that the released brain would also contribute additional pressure, and the ends of the strips of gauze subsequently were, for easy extraction, allowed to emerge from the lower angle of the wound. The dura-mater was partly united over the gauze by several loose sutures, and the scalp wound closed with catgut sutures, leaving room for a drainage tube which was inserted as far

as the opening in the skull. The wound was dressed with gauze and sublimated and iodoformed peat-bags. The patient stood the operation well until toward its close when, probably from the loss of blood, the pulse fell. Under autotransfusion and the administration of whisky his condition improved. At the close of the operation the pulse was 132. Slight diverging strabismus was, however, noticed in the left eye. Heat was applied externally and stimulants ordered. The patient came out of the ether quickly and manifested considerable restlessness, moving all his limbs and having proper voice. Two hours after the operation the pulse had become slower, 120, but gradually weaker, and the dressings were stained with blood which had soaked through them at one point. Three hours later he was found very restless and with an extremely weak pulse. He was conscious, however, though somewhat dull. Transfusion of a saccharated saline solution, as advised by Landerer, was made into the median basilic vein, and was followed by a brief period of improvement. The dressings were removed and the wound opened, when blood was seen to escape in a small stream through the tube from the brain cavity. It was the intention to remove the packing and secure the bleeding vessels by clamps; but suddenly the pulse gave nearly out, and it was decided to crowd in more gauze for the purpose of arresting the bleeding. This was done, flaps replaced, but not sutured, and dressing re-applied. Symptoms of stupor quickly came on, and fearing that pressure might be the cause, the dressings were loosened and as the pulse disappeared entirely at the wrist, a second transfusion was made. In spite of all efforts failure of the heart's action increased and the patient died nine hours after the completion of the operation. No autopsy was permitted, but on removing the gauze, in the lower and anterior part of the cavity was seen quite a large collection of coagulated blood. A microscopical examination of the tumor showed it to be a spindle-celled sarcoma with a few round cells sparsely found in it and not very vascular.

In his remarks on this case, Dr. Weir very properly attributes death to hemorrhage and warns against relying upon pressure in arresting hemorrhage of such severity, and in this locality. He proposes in the next case where ligation or torsion cannot be practiced, to resort to clamp forceps which might protrude through an opening in the flap, and be removed after a period of 24 to 48 hours.

The advice given by Mr. Horsley to arrest hemorrhage as it is incurred in these cases cannot be too strongly emphasized.

Dr. Weir in looking up the literature on this subject has found that up to that time the opening of the skull for the extraction of a contained tumor had been done eight times, once by Bennett and Godlee in 1884, three times by Horsley in 1886. These with Weir's case make up the five cases of removal of a tumor; the result in two cases of Horsley's is yet unknown, but presumably was successful. Of the three other cases, in one by Hirschfelder and Morse in 1886, the tumor was found, but only a part was removed, the patient dying shortly afterward from suppurative encephalitis; in the two remaining cases no tumor was found, though in the one operated on by Weir and reported at length in the Medical News for March 5, 1887, at the post-mortem, two and a half months later, a tumor was found pressing upon the cerebellum and spinal cord. The last case is the one reported by Dr. G. M. Hammond, where the tumor was not found at the operation, and at the post-mortem turned out to be a cyst.

In a paper read in the Surgical Section of the International Medical Congress, Washington, September 1887, Prof. Durante,¹⁷ of Rome, related the following interesting case of operation for a cerebral tumor:—

A woman, 35 years of age, came under his care in May, 1884. Her general health was good, although not of a very robust constitution. The only external appearances that indicated a central trouble was a slight displacement of the left eye-ball downward and outward, which had come on during the last three months. For a year or more she had lost her sense of smell, her memory had become impaired, particularly as to remembering names, and she experienced some difficulty in walking. Motion, sense of touch and sensibility to heat and pain remained natural. Her mental condition had become changed from a bright, happy disposition to a gloomy melancholic turn of mind. Hearing and taste perfect, and digestion unimpaired. The course of the disease, the loss of memory and of sense of smell, and the objective and subjective symptoms led to suspicion of the presence of a cerebral tumor, the pressure of which affected the anterior lobe of the brain, especially the olfactory nerve. The displacement of the eyeball indicated that the tumor had penetrated the superior arch of the

orbital cavity. To reach the tumor, it was necessary to make a large opening in the left frontal bone, so with an incision commencing from the inner angle of the left orbit upwards nearly to the hair line as far as the temporal region, the soft tissues down to the bone were reflected in the form of a flap. The bone being exposed, with a sharp scalpel and hammer a large portion was removed, commencing at the superior orbital margin. During this step of the operation it was found that the internal parietes of the frontal sinus had been forced outward. The dura-mater being now exposed, was examined and a perforation found opposite the frontal eminence. The tumor was scooped out with great care. After a portion had been removed, it was ascertained that it did not adhere beyond the internal surface of the dura-mater, and it was therefore easily enucleated with the adherent portion of the dura-mater. The hæmorrhage was slight and easily controlled with a sublimated tampon. The tumor was lobular, of the size of an apple, and weighed seventy grammes. It occupied the anterior fossa at the base of the left cranium, extending to the right and upon the cribriform lamina, which it destroyed. Posteriorly it extended to the glenoid tubercles before the sella turcica. The left anterior cerebral lobe was greatly atrophied; the orbital arch was much depressed, but not perforated by the tumor as had been anticipated. The cavity was drained by a drainage tube, which was passed into the left nasal fossa through the opening in the ethmoid bone made by a prolongation of the tumor. The external wound was sutured and the nasal cavity closed with an iodoform tampon. The operation lasted an hour and the patient recovered favorably from the chloroform narcosis. A large amount of bloody serum escaped from the drainage tube. On the fourth day the patient complained of mental confusion and became somnolent, and in searching for a cause it was found that the drainage had become arrested. The tampon was removed and with a gum elastic evacuator, about 30 grammes of fluid were removed, which resulted in rapid improvement in the patient's condition. On the seventh day sutures and drainage tube were removed, and on the fifteenth day the patient returned to her home, doing very well. She could now walk without any difficulty, but had not regained her memory or sense of smell. Three months later she had recovered completely her normal mental condition and even the sense of smell. In

locating the sense of smell by experimenting with different aromatic substances, it was ascertained that this function was limited to the right olfactory, as the left must have been completely destroyed by the operation. The part of the bone which had been removed was now partially reproduced, the cavity in the region of the operation had disappeared, and the eye had regained almost completely its normal position. Four years after the operation the patient still remained in perfect health. Microscopical examination of the tumor showed it to be a sarcoma.

In the following case Dr. Suckling,¹⁸ of Birmingham, describes an operation for the removal of a tumor from the cerebellum:—

A girl 12 years of age was admitted into the Queen's Hospital on March 28, 1887, complaining of headache and dimness of vision. Family history good with the exception of a neurotic disposition. She had been in good health until two years of age, when she began to complain of headache, and frequently vomited, especially in the morning. For the last nine months, her right leg and arm became weaker, and for the last three months, the headache localized in the forehead above the right eye had been very severe. For a month past, it was noticed that she was unable to move her eyes outwards, either on the left or right sides, and that the left pupil was larger than the right. For a fortnight there was dimness of vision and diplopia. From the first she had tremor in the right arm on exertion. Vertigo had been present some time, together with a staggering gait, there being a tendency to fall forwards. On admission her right arm and right leg were found considerably weaker, partial facial paralysis on left side, tongue deflected on protrusion towards the right side. Hearing, taste, and smell normal. Severe neuro-retinitis on both sides. Nystagmus present when ocular muscles were strained and absent when muscles were at rest. She could move her eyes freely in an upward and downward direction, but the movement outwards was much restricted on the left side and quite lost on the right. Patellar tendon reflexes diminished on both sides, but more on right side. The gait was staggering, the tendency being toward the left side. The diagnosis of encephalic tumor was rendered certain by the symptoms, and the staggering gait pointed to the cerebellum as being the seat of the growth. The left facial nerve was evidently compressed by the growth, as were also the sixth nerves.

It was thought, therefore, that there could be little doubt that the growth occupied the left lobe of the cerebellum. A probable diagnosis of glioma was made. The operation was performed by Mr. Jordan Lloyd. The patient was prepared for it in the usual manner and one-sixth of a grain of morphine injected under the skin before the anæsthetic was administered. A curved incision downwards was made from the occipital protuberance almost to the base of the mastoid process on the left side. Flap with pericranium raised upwards and muscles separated from under surface of occipital bone downwards. Two one-inch trephine disks were removed from the occiput, the pin of the trephine being applied on each occasion on a line drawn from the occipital protuberance to the tip of the mastoid process, thus insuring the openings being below the lateral sinus. The angles of the bone between the trephine were then cut away with bone pliers, and after all bleeding had been arrested a crucial incision was made through the dura-mater throughout the length and breadth of the osseous opening. The cerebellum bulged into the wound at once, and its tissue appeared darker in color than was natural. No hardness could be felt with the finger; an incision was therefore made into the brain substance. The bleeding which followed was very free. A finger introduced through this wound recognized *softness* in all directions. Part of the cerebellar substance was cut away, and after the bleeding ceased the dura-mater was stitched with catgut and the external wound with silver wire. A small drain was inserted down to, but not into, the bony opening. The wound was sprinkled with boracic acid and dressed with absorbent wool. After the operation the patient was collapsed and unconscious; she became conscious twelve hours afterwards and spoke rationally. She remained however in a collapsed condition, and died about 48 hours after the operation. At the necropsy the left lobe of the cerebellum was found enlarged and hollowed out in the centre, the cavity being occupied by recent blood-clot. The anterior and under portion of the lobe was found bulging and pressing on the left facial nerve. The new growth had evidently occupied nearly the whole of the left lobe, and had invaded the middle lobe also. Microscopical diagnosis,—glioma. This case illustrates the difficulty which faces the surgeon even after he has correctly located a brain tumor, in coming to reliable conclusions regarding its size and relation to

surrounding healthy tissues,—facts which greatly influence his actions at the time of operation. It furnishes also a strong argument in favor of an early operation, as there can be no doubt that had a proper diagnosis been made a year earlier and followed promptly by an operation, the result would have been different. From a number of operations and from a great many post-mortem examinations, it is evident that in malignant tumors of the brain the boundary line between healthy and tumor tissue is more sharply drawn than in the same conditions in other soft parts, and hence if a thorough operation is made at a comparatively early time the danger of a recurrence is much less. There can be no doubt that in this case the loss of blood incurred during the operation may have been at least an important element in the causation of death. Blood abstracted directly from the brain or its meninges is followed by more prompt and serious symptoms than if the same quantity is removed from some other part of the body, and on this account all hemorrhage should be carefully arrested as it is incurred in every step of the operation. It is distinctly noticed that after the brain was incised “the bleeding was very free,” partly because the incision was made through the neoplasm, which was very vascular. In endocranial operations, as well as in other localities, the surgeon should always avoid, if possible, to injure the tumor tissue, as in so doing the hemorrhage is more profuse than when the dissection is made through healthy tissue, or if the tumor is removed by enucleation.

A somewhat similar case as the above is reported by Dr. Weir,¹⁹ only that in this instance the tumor was a metastatic formation. A female, 26 years of age, was admitted into the hospital September 16, 1886, with the following history: She has had four operations in this hospital for sarcoma of the neck during 18 months. During the last operation the brachial plexus was freely exposed, and the patient afterward suffered from paralysis of the left upper extremity, from which she has recovered only partially. Six weeks ago she first noticed cramps in the calf of the left leg, which usually occurred during the night and prevented her straightening the limb. About the same time she noticed that the left knee frequently gave way under her while she was standing, and once she fell in consequence. During the last week she has had occasional clonic spasms of the left leg. Frequent cramps and

numbness in the left hand have been noted during the past six weeks; during the past two weeks the right has been similarly affected. For three weeks she has suffered from frontal headache generally confined to the right side and always worse on walking. On examination no tenderness is found at any part of the scalp, or over either supra-orbital nerves. Function of cranial nerves intact. The right hand is perhaps a little weaker than normal, but the old paralysis of the left hand prevents any comparative test. Paralysis of the left sympathetic is shown by narrowing of the left palpebral fissure (from sinking of the eyeball) and contractions of the pupil. Paresis of left leg below the knee. The left patellar reflex is exaggerated. Ophthalmic examination shows slight optic neuritis on the left side, the disk at the point of exit of the large blood vessels being indistinct. During her stay in the hospital until time of operation (October 11), paralysis of the left leg increased, and she became rapidly stupid. The position of the fissure of Rolando was mapped out, and the tumor located at the upper limit of this fissure, one inch from the median line. The scalp having been shaved at this point, a crucial incision was made, the longer cut being just in front of and parallel with the fissure. The scalp was dissected up, and with a large trephine a button of bone was removed from a spot one inch and a half to the right of the median line; this opening was enlarged with a double gouge-forceps to the size of an inch by an inch and a half. The dura-mater was found to be very tense and bulging. A crucial incision was made through this membrane, whereupon the deeply congested brain substance projected into the wound. Nothing was felt by the finger, and a needle carried in several directions encountered no resistance. As the brain now projected above the level of the skull, a piece half as large as a hen's egg was excised and reserved for microscopical examination. Its substance was deeply pigmented and very vascular. The bleeding was quite profuse, but it was checked by pressure and by Paquelin's cautery lightly applied. The flaps of the dura-mater were laid over the cut surfaces of the brain and covered by a strip of iodoform gauze, one end of which was allowed to protrude from the posterior angle of the wound. External wound closed and antiseptic absorbent dressing applied. Gauze drain removed after 48 hours. The

wound healed rapidly, but within six days a hernia cerebri the size of a hen's egg had formed. As a result of the diminution of cerebral tension the headache disappeared immediately and did not re-appear. The spasms of both limbs also ceased, and a temporary improvement in the impaired muscular power of the left side was also observed. The portion of brain removed showed no neoplastic elements under the microscope. Three weeks later the symptoms again became aggravated. It was evident that the tumor, or a second one, was situated at the upper portion of the cord, or in or about the medulla oblongata. The paralysis increased rapidly, and the patient died December 25th, nearly two months and a half after the operation. At the necropsy a tumor was found which extended down the left postero-lateral region of the spinal canal between the dura and the pia for a distance of at least 10 cm., the cord being naturally much displaced to the right side and anteriorly. The tumor was grayish, translucent, and non-vascular, and presented no evidences of inflammation at any point. It had no connection with the cerebellum, having apparently originated in the pia. Sections of the tumor of the cerebellum and cord were examined, and the growth was found to be an ordinary spindle-celled sarcoma containing many round cells. It was not very vascular and the stroma was not abundant. The temporary improvement in this case was traceable to diminution of intracranial pressure by the extensive opening in the skull and the removal of a considerable portion of normal brain tissue. The focal symptoms upon which the operator relied in locating the tumor, had led him to open the skull some distance from the tumor. It is very important that surgeons should study with the greatest care the focal symptoms in every case of endocranial tumor submitted for operation, as by doing so our diagnostic resources will become more extensive and reliable in the future and may finally reach such a degree of perfection as to enable the operator to locate an endocranial tumor with sufficient accuracy for operative purposes. Mr. Horsley makes the assertion that in all operations upon the brain, a hernial protrusion only takes place when the incision through the soft parts is not properly made, or when the site of operation becomes the seat of an infection. In this case the wound healed kindly and no suppuration followed the operation, but the resistance of the scalp to the intracranial pressure

was diminished by making a crucial incision; this alone, however, might not have been sufficient to lead to the formation of a hernial protrusion. The hernia cerebri in this case was undoubtedly caused by the growth of the tumor which by displacing the brain tissue, was the direct cause of the protrusion.

The significance of optic neuritis as a diagnostic and prognostic sign in cases of cerebral tumors is alluded to by Mr. Horsley in his interesting communication in which he details his experience in cerebral surgery.²⁰ In two of the three cases on which he operated it appears that there was no optic neuritis, and in these two recovery ensued. In the third, a case of cerebellar tumor, there was optic neuritis, and this patient died. To these may be added, besides those reported in this paper, Dr. Hughes Bennett's and Mr. Godlee's case, in which optic neuritis was present, and a case of cerebellar tumor with neuritis, recently operated on by Mr. Bennett May. Both of these were unsuccessful. Thus, out of five cases, the two which had no optic neuritis recovered, while the three which had optic neuritis, died. It may be that this coincidence is accidental, for recoveries take place in some cases of head injuries and cerebral abscesses in which neuritis has occurred, but still its presence must be taken to indicate some complication which is probably harmful, and makes it important that, if possible, tumors of the brain should be recognized before the onset of optic neuritis, and therefore without its diagnostic aid.

IV. CYSTS OF THE BRAIN.

At a Meeting of the New York Neurological Society, April 5, 1887, Dr. Græme Hammond,²¹ related the case of a married woman who complained of severe pain an inch above the right ear, and had left hemiplegia. At the time her symptoms began she was about 29 years of age. She had four children, and during the progress of her disease she had a fifth child. Children all healthy. Her illness commenced by sudden loss of consciousness and convulsions limited to the left side. The left side of the face became and remained paralyzed. About a year later, she noticed gradual loss of power in the left arm; things dropped from the hand. At the end of another year, paralysis of that arm was complete. At this time she noticed increasing weakness in the left leg. When Dr. Hammond first saw her she was able to stand and walk

slowly. While the paralysis was extending she had four or five epileptic attacks, confined to the left side. Headache came on about the time the left leg was affected, became more constant, and was described as agonizing. She denied having had syphilis. Physical examination showed loss of power of motion on left side of the face, the tongue, and the soft palate, also of the left arm, and partial loss of motion of the left leg. Sensibility not impaired. Exaggeration of reflexes on both sides. Special senses normal; choked disk on both sides was observed at a subsequent examination. Medical treatment relieved the headache. The diagnosis made at the time was a probable cerebral tumor involving the cortical or subcortical substance of the motor centers. A proposed operation was declined, and the patient grew worse until March 20, 1887, when, at the request of her husband, the operation was performed. Dr. Spitzka examined the patient on two occasions and coincided in the diagnosis. Four buttons were removed with the trephine, and the openings thus made were connected by straight cuts made with a circular saw. The diameter of the opening was over two inches. A crucial incision was made through the dura, and a hypodermic needle was inserted in different directions, but no fluid could be found. The dura was sutured, a drainage tube introduced, the external wound closed and dressed. She lived only 24 hours, and remained unconscious after the operation. Prior to the operation she had become completely paralyzed in the left lower limb, had delusions and hallucinations, talked incoherently, and had bed-sores. At the necropsy but little hernial protrusion was found. The cortical substance at the site of operation was thin. An incision through the motor region revealed three cysts in a line, deep in the white substance. The fluid, which was only partially examined, contained serum and broken down brain substance. The cysts were close together and in a position to affect the face, arm and leg centers. The failure to find the fluid with the exploring syringe was attributed to the fact that the point of the syringe was not inserted sufficiently deep to reach them, or had passed between the cysts. Although no explanation of the nature of these cysts is given, there can be but little doubt that they were apoplectic cysts; a view which is sustained by the clinical history of the case and the absence of anything like a cyst-wall.

A somewhat imperfect account of an operation on the brain for an echinococcus cyst is given by the *Melbourne Age*, a non-professional Australian Journal.²² The operation was performed January 27, 1887. The patient was a girl, 16 years of age, who had been recently admitted into the hospital suffering from loss of sight in the right eye, partial paralysis and convulsive attacks. Mr. Fitzgerald, a surgeon of considerable reputation, diagnosed the presence of an echinococcus cyst in the brain. The patient was chloroformed and a button of bone one inch in diameter removed from the left temple; the dura-mater was then incised, a trocar inserted through the substance of the brain, and the cyst successfully punctured, a large amount of fluid coming away. The diagnosis was subsequently confirmed by a microscopical examination of the fluid removed.

Dr. Macewen performed a successful operation for a cyst underneath the dura, which had developed after an injury to the skull.²³ A little boy, 4 years of age, had sustained an injury of the skull in the temporo-parietal region a few months before his admission into the Royal Infirmary. Almost immediately after the injury hemiplegia was observed on the opposite side. The paralysis remained, and was complete on his admission to the hospital. Under strict antiseptic precautions, a disk of bone was removed with the trephine over the fissure of Rolando at a point corresponding to the motor center for the lower extremity. The dura-mater was found tense and nonpulsating. It was incised and several ounces of a clear fluid escaped. Further examination revealed a subdural cyst lined with a brownish membrane. A sharp fragment of bone from the internal table of the skull found projecting into the brain was removed. The interior of the cyst was scraped out with a sharp spoon, and another smaller opening made in the skull and membranes at a lower point, for more complete drainage. The disk of bone was re-implanted, only a small opening being left to secure drainage at this place. Macewen explained the case by attributing the immediate symptoms to fracture of the skull and subdural hemorrhage sufficient in amount to cause the primary paralysis, and that subsequently a cyst formed at the site of the clot which kept up the paralysis. Six weeks after the operation the wound had completely healed and the bony wall of the cranium, where the operation was performed, was perfect and only slightly depressed.

The paralysis had disappeared soon after the operation and the recovery was complete and satisfactory in every respect.

At a meeting of the New York Surgical Association, October 26, 1887, Dr. Markoe²⁴ presented a patient who had recovered from an operation on the brain performed for an obscure and ill-defined lesion.

A man, 25 years of age, fell, in 1879, from a height of about eight feet, striking on his head. He was stunned by the blow and remained unconscious for a certain time. Inflammation of the brain followed, from the effects of which, however, he gradually recovered, until about two months from the time of the accident, when he had his first convulsion. Convulsions now recurred at irregular intervals for about two years, sometimes becoming as frequent as three or four in a night. These attacks gradually became less frequent and at the end of two years ceased altogether. At this time he was in good health and attended to his duties as a clerk. There was no renewal of the epileptic seizures until about a month before his admission to the hospital, January 15, 1887. At that time, while taking a bath, he accidentally struck his head, receiving rather a severe blow. No marked effects followed, but within a week after, a convulsion occurred which was repeated at intervals more or less short, and they became as frequent as four during the night. On admission he was anæmic and thin, but nervous and excitable and quite intelligent. He had perfect possession of all his faculties, both mental and physical, and had at no time had any symptoms which could be referred to a cerebral lesion, except pain and the convulsions. The head was irregular in shape, the frontal region prominent, the right parietal region bulging markedly, while the corresponding region on the left side was as markedly depressed. In the centre of this flattened area was a marked depression as large as a half dollar. He had continual dull pain referred to the depressed spot. The headache of which he complained lately seemed to radiate from this point, though at times the pain had been felt on the right side. Although large doses of bromide of sodium were given the epileptic attacks continued. There was no aura, no cry, nor did the muscular spasm begin at any single point. The spasm assumed the form of opisthotonos, alternating with extreme flexion, and followed by sleep.

The operation was performed January 27, 1887. The point of operation selected was the centre of the depressed portion of the left parietal bone, which corresponded quite accurately with the region of greatest pain, and which was on a level with and about an inch and a quarter in front of the left parietal eminence. A disk of bone with a one and three-quarters of an inch trephine was removed. The dura-mater when exposed did not bulge, but nevertheless presented a decided sense of fluctuation. Between the dura and the brain a firm hard surface was felt, which the finger reached after pressing through perhaps two lines of fluid. The dura was now opened by a semicircular incision, one line within the edge of the margin of the opening. After its reflection, a surface was exposed of a bluish-white color, as if it were the surface of a thin semi-transparent sac containing fluid. The sac being opened gave issue to some thin pellucid fluid in quantity at least a drachm, and revealed the contents to be two unequal bodies of a rounded shape lying close together forming a mass about an inch in diameter as looked at from above. These masses did not present the appearance of the normal cortex, but were more grayish in color, of a distinctly granular appearance and firmer to the touch than the normal surface of the brain. Without the use of any force the handle of the scalpel passed easily around the mass and turned it out of the areolar bed in which it had lain. This removal showed that the walls of the cyst were continuous around the periphery of the tumor, and that the whole had been buried deep in the cerebral substance, pressing it down more than half an inch. No hemorrhage attended the removal of the detached bodies. The dura-mater and external wound were closed separately by sutures. The external wound was drained with catgut and covered by a light antiseptic dressing. Moderate reaction followed the operation. Some mental excitement with amnesic aphasia and paresis of right arm was noticed for several days after. These symptoms, however, were never serious, and subsided entirely during the second week. The wound healed by primary union, and the patient was discharged well on the 19th of February, no convulsions having occurred since the operation 23 days previous. A microscopical examination of the bodies removed made by Dr. Prudden, showed that they were composed of white and gray brain-tissue normally arranged. In concluding his report Dr. Prudden

says: "The microscopical appearances do not throw much light on the peculiar conditions which you found at the operation, and I am entirely at a loss to account for them, except on the hypothesis of an aberrant of brain-tissue which had developed at the seat of operation." Another explanation for the conditions found in this interesting case could be offered by assuming that a contusion of the brain with considerable hemorrhage had been produced by the injury, and that certain areas of brain-tissue had become isolated during the reparative process, while at the site of the blood-clot a cyst was formed. It is quite strange that such an extensive lesion did not give rise to focal symptoms, the more so, as after the operation, which was attended by a minimal, if any, injury to the brain, focal symptoms appeared which lasted for more than a week.

V. TREPHINING FOR EPILEPSY.

Recent experience in the surgical treatment of epilepsy has only strengthened the faith of the profession in this method of treatment in well-selected cases, where some tangible lesion in the skull or its contents can be brought into direct connection with the development of the disease. The operation of trephining has been shorn of its great risks since the introduction of antiseptic surgery, and hence the surgeon is warranted in proposing and performing an operation in all intractable cases of this dreadful disease, where he is able to detect some local cause amenable to direct treatment, as if he fails to cure the disease he has the consolation that his interference does not expose the patient to any great risks to life, and seldom, if ever, is followed by aggravation of symptoms.

In the case which has recently been reported by Dr. Oliver²⁵ of Newcastle-on-Tyne, the interval of time which had elapsed since the operation was performed without the recurrence of the epileptic seizure, makes it probable that the relief afforded by the operation may be considered complete. In this case, the epileptiform convulsions came on about a fortnight after an injury to the head in a young man previously in good health. After their first development he suffered from them almost daily, whilst he also complained of a painful spot on the right side of the head, a little above and anterior to the ear, which always became more painful just before and often soon after a fit. After a more severe fit than

usual the patient would remain powerless for two or three days, as well as being deaf and unable to speak. In these severe attacks it was noticed that the convulsions were more marked on the right than on the left side. Medicinal treatment having been perseveringly tried, it was determined to trephine the skull over the painful spot. The moment the disk of bone was elevated, the dura-mater bulged into the wound and looked and felt very tense. An incision was made, and a few tea-spoonfuls of serum containing shreds of fibrin escaped. The membrane and surface of brain appeared to be quite healthy. For about a day after the operation serum continued to escape from the wound in the dura-mater, amounting in all to about two or three ounces. Two or three fits occurred on the day of the operation and the day subsequent to it. Gradually, however, days, then weeks, and latterly months, passed without the occurrence of any attacks. Afterwards the patient was engaged as a clerk, and was confined in a heated atmosphere and had long hours of business. One evening, after a period of six months, he had a fit, but without loss of consciousness, and for a few days after this he had some minor seizures, but these speedily yielded to treatment, and for a period of six months not a fit of any kind recurred. The success which followed trephining in this case was undoubtedly due to the evacuation of the products of a circumscribed pachymeningitis. The painful spot on the right side of the head had served as a guide to the pathological condition which had given rise to the disease.

The following three cases of trephining for epilepsy have been reported by the present master of cerebral surgery, Mr. Horsley.²⁶

CASE I.—James B., aged 22. At the age of 7 the patient was run over by a cab, sustaining a depressed comminuted fracture, with loss of brain substance on the left side of the vertex, exactly over (ascertained by measurement) the upper third of the ascending frontal convolution. The fragment of bone was removed, hernia cerebri occurred, and the patient was hemiplegic for seven weeks. At fifteen years he began to have fits, and in May, 1886, was having as many as 3000 seizures in 14 days. The patient was distinctly hemiplegic, even ten days after the last fit, but could perform all movements of the right limbs, though about half as strongly as on the left side. There was no affection of sensation on the right side, while the reflexes, superficial and

deep, were exaggerated in both right limbs. On May 25, 1886, the bone around the old opening was freely removed, the scar and about half a centimeter of surrounding brain substance was excised to the depth of two centimeters, and a little more, and the wound closed. Up to the date of publication the patient had no fits.

CASE II.—Thomas W., aged 20, began in January, 1884, to have "cramps" in the left thumb and forefinger. The first severe fit occurred in March, 1884. The character of the fits was almost always the same. They began by chronic spasmodic apposition of the thumb and forefinger (left), the wrist next, and then the elbow and shoulder were flexed clonically, then the face twitched, and the patient lost consciousness. On admission the left hand had only half the strength of the right. Sensation was unaffected. On June 22, the seat of the lesion having been determined by measurement, the large trephine was applied, and on raising the dura-mater a tumor came into view. The parts diseased were freely removed and the wound closed. The patient made a good recovery, after manifesting various motor and sensory disturbances in the left limbs, and at the time of publication had had no fit since the operation. The tumor was composed of dense fibrous tissue with two caseous foci.

CASE III.—George W. J., aged 24, received when five years old a blow on the vertex of the head from the falling shaft of a carriage, inflicting a wound and slight punctured fracture. At 13 years old he was kicked by a horse on the same spot. Three months later the fits began. On admission there was the scar and minute depression of a slightly depressed fracture in the upper anterior angle of the left parietal bone close to the middle line. The scar and adjacent scalp were very tender to pressure. There was almost complete right hemianaesthesia. In the seizures the right limbs were convulsed before the patient lost consciousness. After the fit the patient stated that the right arm felt weak for some time. At the operation on July 13, 1886, the dura-mater was found to have been torn by the original injury, and projecting downwards into a cavity in the brain was a rough, small plate of bone. The fragment of bone and the walls of the cavity were removed. The wound was completely healed in four days. Although the time which had elapsed between the operation and the

publication of the report had not been sufficient to warrant us in coming to definite conclusions in reference to the permanent value of the operation in these cases, the prompt improvement which followed in each case leaves no doubt that the local pathological conditions which were removed constituted the principal, if not the only, cause of the epilepsy. Numerous cases are now on record where the removal of a projecting fragment of bone from the brain produced epilepsy years after the injury had been received, and where upon trephining the epileptic seizures were permanently arrested.

Dr. Garmany,²⁷ of New York, relates the case of a girl about 18 years of age, who had been struck on the head with a brick falling from a house-top, causing a fracture of the skull. The skull was trephined and the splinters of bone were removed, but some time after the wound had healed she began to have attacks of epilepsy, for which ordinary treatment had been unavailing, and the reporter operated on her with an entirely successful result. As a result of his researches upon the subject, he had found that lesions in the frontal and parietal regions were followed usually by the same symptoms, and that over 50 per cent. of these lesions were followed by epilepsy, which was eventually complicated by insanity. Trephining at the site of the lesion and removing the cicatrix was usually followed by complete relief. As the formation of a cicatrix in this case, at the site of injury, had been the means of causing epilepsy, we have no security after any operation for the cure of this disease, that the patient will remain exempt, as the very means employed for its cure by surgical procedure, as removal of a projecting, embedded fragment of bone, or excision of a cicatrix, are followed by a cicatrix which may again lead to a recurrence of the disease. In a discussion on this subject in the Medical Society, of London, Dr. Savill²⁸ refers to a case that came under his observation in which some time after operation, fits returned. This, he thought, was explained by cicatricial contraction at the site of removal of the tumor. To prevent a relapse from this cause it becomes exceedingly important for the surgeon to bring the soft parts, in the treatment of the visceral wound, in such position, that healing will take place by the interposition of a small amount of cicatricial material. Cases have been observed where, after trephining for epilepsy or other endocranial indications,

the patients passed into a condition of stupor for which it has been found difficult to find a satisfactory explanation.

Dr. Prewitt,²⁹ of St. Louis, reports such a case. A negro, 27 years of age, had been kicked by a horse in the left temporal region; epileptic convulsions developed in a few years later and were becoming more frequent, violent attacks occurring once a month. A depressed fracture of the skull was found in the temporal bone above the zygomatic arch. The depressed bone was removed by the trephine. As the disk of bone was elevated, quite a free flow of cerebro-spinal fluid escaped from a little opening at a point corresponding to the center of the button where a perforation of the dura-mater had evidently been made by the pin of the trephine. The free escape of fluid was attributed by the operator to the position of the opening, which had been made low down and close to the fissure of Sylvius. During the operation the pulse rate fell to 60. During the afternoon of the same day the patient was found in a condition of stupor, which was noticed since the operation, and from which he could not be aroused. Temperature 101° F. During the night a considerable amount of the same serous fluid escaped, and the next morning the patient was found in the same comatose condition. Pulse still rather slow. He could be roused sufficiently to answer in a sort of mumbling way if spoken to in a loud tone. The same afternoon the temperature went down to 100 F. There were no evidences of inflammatory reaction, no compression, and the bleeding that might have occurred had free exit, as the wound was provided with a catgut drain. On the third day he had 20 or more epileptic convulsions. The stupor in this instance was ascribed to loss of cerebro-spinal fluid, and it was believed, too, that the convulsions might have been due to the same cause, as it was stated that after rupture of the sac in cases of spina bifida children die with convulsions. In the discussion that followed the report of this case, Dr. Bryson sought to explain the symptoms by referring them to a venous congestion of the brain and its envelopes which follows the diminished intracranial pressure after the rapid draining away of the cerebro-spinal fluid.

Dr. Mudd believed that the symptoms after the operation were caused by irritation and hyperæmia. In some instances the cause of epilepsy has been traced to inflammatory lesions in the

substance of the brain itself, and the disease has been promptly cured by the removal of this source of irritation. Dr. Macewen³⁰ has recently operated successfully on a case of traumatic epilepsy. A young man in perfect health received an injury to his skull some two years ago. No symptoms attributable to the injury were observed until six weeks before his admission into the Royal Infirmary, when he was attacked with severe headache and epilepsy. He had a hundred or more attacks daily, but never completely lost consciousness. The muscular spasms were limited to the side opposite where the skull was injured. At the site of injury a slight depression could be felt. At this point a disk of bone was removed with the trephine, which directly exposed the brain, showing that the meninges were ruptured at the time the injury occurred. Where the brain was exposed a limited circumscribed area of inflammation and softening was found, but no evidences of suppuration. The diseased tissue was removed with a sharp spoon, and although the patient at this time appeared to be thoroughly under the influence of chloroform he had a violent convulsive attack. The cavity created by the spooning was drained through a defect of the bone disk and the usual antiseptic dressing applied. Since the operation the patient has been free from pain and convulsions, and as the wound is nearly healed we can safely assume that the recovery will be complete. It is now generally conceded among neurologists that idiopathic epilepsy has its origin in the cortex of the cerebrum, and from a surgical standpoint it is therefore not difficult to understand that any chronic endocranial lesions which affect this part of the brain can produce epilepsy. Römer³¹ reports two cases of epilepsy permanently cured by trephining where the disease was caused by a trauma, followed by an accumulation of serous fluid between the brain and the dura mater or the dura and bone. In one case the operation was performed two years after an injury of the skull caused by a gunshot wound in the right parietal bone. Under the dura mater was found a circumscribed fluctuating place, from which, after incision, about four ounces of a serous fluid escaped. In the other case, the patient suffered also from a gunshot wound of the skull and recovered completely, but after a year became epileptic. On removing a disk of bone a small exudation between the bone and dura-mater was exposed and liberated. In both of

these cases it is more than probable that a corresponding area of the cortical portion of the brain had undergone pathological changes, and that the removal of the products of a circumscribed pachymeningitis or leptomeningitis brought about conditions favorable to the repair of the central lesion. Walsham has recently collected 82 cases of trephining for traumatic epilepsy, and has shown that of this number 48 were permanently cured, 13 were improved, 4 were not improved, and 17 died. Of the fatal cases death was caused by suppurative inflammation in 9. A valuable contribution to the literature of traumatic epilepsy has recently been made by Von Bergmann.³² He calls attention to the excellent treatise on this subject in the last volume of the sanitary report of the German Army, 1870-71, in which it is very clearly and conclusively shown that grave injuries of the skull are not infrequently followed by epilepsy. The author looks upon the convulsive attacks which follow as one of the remote consequences of injuries to the skull not only as epileptiform attacks, but also as genuine epileptic fits. The epileptiform convulsions which occur after injury of peripheral nerves are also considered as true epilepsy. In the work just referred to 17 cases of traumatic epilepsy are described where the disease could be traced to gunshot injury of peripheral nerves. While he recognizes the existence of an epilepsy due to reflex causes arising from a lesion of a sensitive nerve in the cranium or its coverings, caused by a cicatrix or foreign body, he attributes most cases of epilepsy following an injury of the skull to a lesion of the surface of the brain. The surgeon has to deal with two distinct etiological factors, with reflex epilepsy caused by an affection of peripheral nerves which indirectly affect the cortex of the brain, and with epilepsy caused by a lesion of the cortex itself. The treatment of traumatic epilepsy will pass more and more into the domain of cerebral surgery, which must have for its object the removal of cicatrices or cicatricial masses from the motor area of the cortex, or the removal of that center from which each attack proceeds. The latter indication is of recent date, and although Weismann operated on such a case the subject has received only general attention since Horsley reported his case, which has been alluded to briefly in this paper. Von Bergman reports the following case where he attempted to cure an epileptic by excision of a motor field from the cortex from which

he believed that the convulsive movements proceeded. A man 20 years of age received a fracture of the left side of the skull when a child of four years. Immediately after the injury he fell down, but recovered so quickly that after two hours he resumed his play. The attending physician diagnosticated a compound fracture of the skull which, as suppuration set in, required several months before it was completely healed. For a week after the injury the right side of the body was paralyzed. Two years later the child suffered from attacks of vertigo and convulsions. The attacks became more frequent, as many as six during 24 hours. The convulsive movements affected mostly the right side and during the attacks the patient lost consciousness. Right leg and arm considerably atrophied. The attacks usually commenced with hyper-extension of hand and fingers, followed by clonic spasms of the arm and leg on same side; finally the convulsions spread over the entire body, during which time the head was generally drawn down toward the right side. The attacks were not always the same, only one thing was always constant—the tetanic extension of the right hand during the beginning of the attack. Over the left parietal bone was a small cicatrix firmly adherent to the subjacent bone in which a small defect with sharp margins could be felt. The lowest portion of the scar corresponded with psycho-motor centers, in which the muscles which move the hand are principally represented. February 2d the patient was trephined. An incision was made from the sagittal suture downward through the center of the scar. On reflecting the periosteum, the defect in the bone was exposed and was found $\frac{2}{5}$ mm. in width and somewhat longer, and filled by a mass of cicatricial tissue which connected the dura-mater and arachnoid with the external scar, and tearing through this adhesion a considerable amount of cerebro-spinal fluid escaped. The opening in the bone was enlarged by chiselling, when it was found that a detached fragment the size of a mark had become displaced between the bone and the dura-mater. The upper margin of the opening extended to within one cm. of the sagittal suture. After the hemorrhage, which was moderate, was carefully arrested the wound was disinfected with a $\frac{1}{2000}$ solution of corrosive sublimate. Next the dura mater was excised over an area corresponding to the defect in the bone and hemorrhage again carefully arrested. At a point corresponding to the scar the brain presented a depression

filled with loose tissue traversed by cystoid spaces which had undoubtedly furnished the fluid that had previously escaped. The arachnoid and pia-mater had to be carefully removed with forceps before it was found possible to determine the location of the sulci and convolutions. Immediately behind the sulcus Rolandi at the point which corresponded to the extensors of the hand a piece of the cortex one c. cm. in size and 3 mm. in thickness was excised. The wound was again carefully irrigated with the same solution, dried, and again moistened with iodoform ether. The dressing was then applied; first a few layers of iodoform gauze, and as absorbents, sterilized mull and cotton. The dressing was removed after two days, when the wound was sutured, leaving a defect by excision of the cicatrix. Wound completely healed in three weeks. Immediately after the operation the hand, which had before always been in the extended position, dropped, and could no longer be extended, but flexion remained unimpaired. It was evident that the center which it was aimed to remove by the operation had been completely extirpated. The operation, however, had no influence in diminishing the severity or frequency of the epileptic attacks. The failure in this case is attributed by the author to a number of causes, principal among them the long duration of the disease and the existence of secondary degenerative changes.

The indications for operative treatment of epilepsy are well defined by the author and are limited to cases where the clinical evidences point to a traumatic epilepsy of the cortex of the brain; to cases where the attack commences in a definite muscular group; where typical extension takes place to same and opposite side of the body, and finally where semiparesis or paralysis occurs in the muscles first affected. In all cases of well-characterized Jacksonian epilepsy tangible changes can always be found in the cortex of the brain, which, being the seat of the disease, should be removed by the surgeon. Another indication for surgical treatment is offered by cases where the disease can be traced to a peripheral source, as a cicatrix, which then should be excised with a view of removing the reflex symptoms by removing the peripheral irritation. Operative treatment is contra-indicated in cases where the attacks come on suddenly, where the patient falls down at once, and a general tonic spasm is followed by clonic spasms which affect at the same time all the muscles of the face and extremities.

VI. TREPHINING FOR TRAUMATIC INSANITY.

During the last two years a number of successful cases of trephining for traumatic insanity have been reported by Horsley, Price, MacDonald, Fletcher and others. When we consider that under strict antiseptic precautions trephining can now be done with hardly any risk to life it must become apparent that in cases of insanity following remotely a fracture of the skull this operation holds out a new ray of hope in otherwise hopeless cases. The success which has attended the operation so far is sufficient to warrant further trial. It is reasonable to hope that where tangible lesions are found at the seat of injury in the brain or its envelopes their removal by surgical interference will have at least a beneficial influence in restoring normal brain function. In a recent article on this subject Dr. Fletcher,³³ Superintendent of the Indiana Hospital for the Insane, reports 8 cases of trephining for traumatic insanity. In these cases insanity did not occur at or near the time of the injury, but some years afterward. In three cases epilepsy preceded the insanity, but remote from the time of injury. In all but one (and in that case the injury was most extensive in appearance) very strong adhesions to the dura were found. All the patients were, at the time of the operation, melancholic, suicidal, profane, and 4 destructive to clothing; none are so now. "I believe," says Dr. Fletcher, "that in traumatic injury, in which sunstroke is included by most authorities, the pain and reflex nervous affections most frequently arise from the inflamed and adherent dura-mater at points where one of the three sensory branches of the fifth nerve is involved. In none of these cases do I think the cortex had undergone any pathological change." In two cases it was noticed that in tearing up the adhesions the face, platysma and fingers on the same side were convulsed, while a probe passed freely upon and into the convolutions without causing visible signs of excitement. It would be comparatively easy, says the author, to locate most injuries and diseases of the cerebrum were it not for the complicated nervous connection of the dura-mater. As Duret says: "Their varied and, so to speak, protean manifestations tend at each step to complicate the whole symptomatology by superimposing themselves in the phenomena due to lesions of the nerve centers proper." More than this, every one knows that cic-

trices of the scalp from old wounds often give the impression of depressed bone. They are often sites of acute pain, may cause insanity and partial paralysis and convulsions from the fact that the dural branches of the fifth nerve are involved in the external cicatrices. In view of the fact that insanity so often follows fracture and depressions of the skull, Dr. Fletcher is inclined to inculcate the doctrines of Hunter regarding injuries of the head: "As we cannot tell for certain at the time whether the symptoms arise from concussion, compression or extravasation of blood, it may be more advisable, as the operation can do no harm." There can be no doubt that cerebral surgery is destined to increase the number of recoveries in cases of insanity where the disease can be traced to a traumatic origin.

VII. ANTIQUITY OF TREPHINING.

An interesting address was recently delivered by Mr. Horsley³⁴ at the Royal Institution, on the subject of "Brain Surgery in the Stone Age." Having referred to the fact that our present civilization is the outcome of man's working in stone, bronze and iron in successive epochs, he said it was certain that as Troy was being overwhelmed by a race who had but quite lately learnt the real power embodied in the use of iron, and who were still clad in splendid bronze armor, the great nations of the Northwest, whose surgical skill was his theme, were perforce content to satisfy their domestic needs with sharpened stone, while the luckiest among them but rarely owned a single metal instrument,—even a bronze one.

It was to him a most fundamentally important question whether the art of trephining had not reached a relatively high development in Asia before its introduction into Europe, or whether it could have been really evolved as a definitely new procedure in France, whence we obtained the clearest evidence of its use. He leaned to the view that some light broke upon us from the history of its decline rather than from its rise. It was during the polished-stone period that this branch of surgery especially flourished in France, while in the same age it was carried on in the neighboring European countries, though in a far less degree. Hence, whereas the Broca Museum of Anthropology in Paris contained about sixty specimens bearing on this point, including about

10 fairly complete crania; on the other hand, the skulls operated on in all Europe besides could be counted on the fingers. Mr. Horsley, having spoken of the domestic life and habits of the dwellers in caves, showed by reference to a manuscript of the 13th century that the mode of perforating the skull adopted by the stone-age peoples was either by scraping, drilling or sawing the bone, the balance of evidence being in favor of the last process. He next showed that not only the pieces of bone which were removed, but also the edges of the holes thus made were thought to possess beneficial, probably supernatural properties, and the fragments were worn as amulets. He further showed, from the pathological evidence afforded by the specimens, that the majority of the patients must have survived the operation. After fully describing the technique of the operation, the question as to the reason of its being undertaken was considered. He found that most of the operations appeared to have been performed on the vertex of the head, and that therefore they were probably undertaken to relieve depressed fractures. The speaker then drew attention to the significant fact that the holes were also grouped, almost without exception, over the motor and epileptonic region of the surface of the brain. He further suggested that since a depressed fracture in this region would almost certainly give rise to epilepsy, and at the same time occasion such local pain as to call for its removal, for that reason alone it was obvious that traumatic epilepsy would be relieved if not wholly cured by a trephining operation originally designed for nothing else but the relief of the fracture,—a result which would certainly lead to wider adoption of the operation.

VIII. NERVE SUTURE.

During the last few years the clinical material of nerve suture has been accumulating quite rapidly, and the combined experience of surgeons speaks strongly in favor of primary as well as secondary operations.

Material for Suture.—In a lecture delivered at the Royal College of Surgeons, Mr. Bowlby³⁵ gives some general remarks on this subject. In the majority of cases recorded, catgut has been used, and he is inclined to consider that for small nerves carbolized catgut is the best material. In those cases, however, in which there is any unusual tension, or in which it is anticipated that on

account of any complication it may be necessary to disturb the wound, he thinks that carbolized catgut does not possess the proper amount of resisting power, and does not last a sufficient length of time. In such cases he prefers a more durable ligature, —such as chromicized catgut, kangaroo tendon split into sufficiently small filaments, horse-hair, or fine silk. During the last year the use of catgut sutures and ligatures has been strongly condemned by Kocher, of Bern, who has pointed out the danger attending the use of this material, as the ordinary methods of preparation afford no guarantee of its asepticity. His remarks apply with equal force to sutures made of other absorbable animal material. Fine aseptic silk will undoubtedly take the place of catgut, not only in suturing nerves but also in suturing tendons, muscles, and in uniting wounds.

Primary Suture of Nerves.—The same author summarizes the cases of this class that came under his observation at St. Bartholomew's Hospital as follows: The median nerve was sutured on eight occasions, each time with success. The ulnar nerve was sutured the same number of times; of these, two cases were completely successful, two were partially successful, and three were failures. In one case primary suture failed, and a secondary suture seven months later was followed by complete recovery. The median and ulnar nerves were sutured at the same time in one patient with success. In collecting all cases of primary nerve suture, as late as the end of the year 1885, he gives the following figures: Of primary suture of the median nerve six cases were "successful," six were "doubtful successes," five were partially successful, two were failures, and in one case the result was not stated. Of primary suture of the ulnar nerve four cases were successful, four were doubtful successes, three were partially successful, and four were failures. Of primary suture of the musculospiral nerve four cases were successful. Of primary suture of the radial nerve one case was successful. Of primary suture of the median and ulnar nerves simultaneously two cases were successful, two "doubtfully successful," four were partially successful, and three were failures. Of primary suture of the sciatic nerve one case was partially successful. Of primary suture of the peroneal nerve one case was a failure. Of primary suture of the posterior tibial nerve one case was partially successful. These cases added

to his own seventeen gives a grand total of seventy-one, viz., successful, 29; doubtfully successful, 12; partially successful, 16; failures, 13; result not stated, 1. In many of these successful cases no improvement followed for several months, or even a year, and yet in the course of time the recovery was complete.

Tillaux³⁶ reports a case where primary nerve suture appeared to be followed by complete restoration of function on the following day. A young man falling on some glass sustained a large wound of the posterior aspect of the forearm,—the median and ulnar nerves were divided and sensibility was entirely lost. The nerves were sutured at once, and on the following day sensation had returned to the end of the fingers. The evidence of this case seems to be positive in favor of the idea that rapid union is possible after primary nerve suture, or that, at least, by bringing into accurate apposition the divided ends of the nerve, the communication between the brain and the distal parts is rapidly restored.

A case of rapid restoration of function after primary nerve suture is described by Mr. Herbert Rowe.³⁷ In this case the ulnar artery and nerve were divided at the same time. The nerve was sutured with fine catgut. Two days afterwards there was a diminution of numbness. In four days the sensation was the same, but there was some slight movement in the muscles. At the end of one month sensation was but slightly impaired, and motion was definite but not perfect. Shortly afterwards the man resumed his occupation. Mr. Rowe referred in his paper to cases reported by Nélaton and others, in which sensation partly returned at the end of the second day, recovery taking place at the end of a week.

M. Schwarz³⁸ treated a young man who had inflicted a large wound over the anterior aspect of the forearm, which had completely severed the median nerve. He resorted to primary nerve suture, and on examination five weeks later he satisfied himself that sensation in the entire district supplied with branches of this nerve was not quite perfect.

At a meeting of the Société de Chirurgie, June 1, 1887, Polaillon³⁹ presented a case of primary and secondary nerve suture which he had done on the same patient. The case was that of a man who had a wound of the wrist by which the cubital and median nerves were severed. The two nerves were sutured at once without success; sensibility did not return. Upon the ad-

vice of the Society a second operation was practiced, and after great difficulty the median nerve, whose ends were separated nearly an inch-and-a-half, were reunited. Five hours after the operation sensation had returned, and, strange to say, sensation in the ulnar distribution was also established. M. Polaillon considered that to obtain an immediate return of sensibility the nerve ends should be carefully coaptated, and that healing should be obtained by first intention. In a more recent communication on the same subject Polaillon⁴⁰ again expresses his conviction that immediate union and restoration of function after nerve suture is possible. He believes that this result is more frequently obtained since the adoption of antiseptic precautions before and during the operation. As suturing material he prefers catgut to silk, as the former is an absorbable material, and is removed after union between the nerve ends has taken place, while the latter remains for an indefinite time and may constitute in the tissues a source of irritation. He uses a curved, fine, round needle. He places great stress on bringing the ends of the nerve fibres in accurate contact by carefully preventing interposition of other tissues, and accomplishes this by direct transfixion of the nerve ends by the sutures, uniting the neurilemma later separately. For a nerve the size of the median, two direct sutures are sufficient, while larger ones may require three sutures. The needle should be passed through the nerve about 8 to 10 millimetres from its end, so that the thread should not cut through the tissues in approximating the cut surfaces in tying the sutures. During the process of repair the limb should be placed in a relaxed position, and the parts kept at rest by immobilization. The soft tissues overlying the sutured nerve are carefully united and the wound treated in accordance with the strictest antiseptic precautions, so as to secure union by first intention. If immediate restitution of function in a divided nerve is possible by accurate coaptation of parts, we have no reason to doubt the correctness of the observations made by a number of surgeons who found restored functions a few hours after suturing. Immediate union between divided parts, in the sense in which the word is usually used, cannot take place within a few hours, but requires days and weeks for its completion, even under the most favorable circumstances.

Secondary Nerve Suture.—In his most excellent lectures on

injuries of nerves, Mr. Bowlby⁴¹ brings a summary of all cases of secondary nerve suture up to December, 1885, to which are added the cases that came under his own observation in St. Bartholomew's Hospital. The material gives a good résumé of the ultimate results which have been so far obtained by the secondary suture. The following cases of secondary suture were performed in St. Bartholomew's Hospital up to December, 1885:—Median nerve, successful, 1; partially successful, 4; failure, 1. Ulnar nerve, successful, 2; partially successful, 5; failure, 3. Musculo-spiral nerve, successful, 1. Median and ulnar nerves, partially successful, 1.

Cases of secondary nerve suture recorded in surgical literature up to December, 1885:—Fifth cervical nerve, successful, 1. Median nerve, successful, 3; partially successful, 5; failure, 3. Musculo-spiral nerve, successful, 11; greatly improved, 3; failure, 2. Radial nerve, successful, 1. Median and ulnar simultaneously, successful, 1; partially successful, 2; failure, 3. Median and radial simultaneously, partially successful, 1. Sciatic nerve, successful, 1; improved, 1; failure, 1. Popliteal nerve, improved, 1.

All cases together give the following result:—Successful, 27; partially successful, 24; failures, 16. Total, 67.

In reference to prognosis, this material shows that the process of restoration is greatly influenced by the length of time which has elapsed since the injury occurred, the degree of muscular atrophy, age, temperature, and the nerve which is the seat of the lesion. The musculo-spiral is more prone to unite than any other nerve. The process of repair takes place more rapidly in the young than the old, in recent than in old cases, and in warm than in cold weather. In reference to the matter of time, it can be stated that so far in no case has complete restoration of function ensued when operation has been delayed more than a year. The causes of failure are many, but of those enumerated may be mentioned suppuration in the wound, sloughing of the nerve, and compression of the nerve by cicatricial tissue. The literature on secondary nerve suture has been materially increased during the last year.

Mr. Scott,⁴² in a paper on nerve suture read in the surgical section of the Academy of Medicine in Ireland, relates the case of a man, aged 21, who sustained an injury to the palmar surface of his right forearm, about one inch and a half above the wrist joint, by putting his hand through a plate of thick glass. The accident

occurred four months prior to admission into the Adelaide Hospital. There was distinct evidence from the condition of the hand that the ulnar and median nerves had been completely divided without any attempt at regeneration. On April 16, 1886, 18 weeks after the injury, the ulnar nerve was sutured, three catgut sutures being introduced to bring the freshly-cut surfaces together. Five days after the operation sensation had markedly improved. The median nerve was sutured on August 31st, 1886, almost ten months after the injury. Three weeks after the operation the patient could distinguish the touch of a pin's point anywhere in the area of distribution of the median nerve. In the discussion which followed the report of this case, Dr. Tobin referred to an instructive case which came under his observation at Suakim. A soldier received a gunshot wound of the elbow and forearm in which the ulnar nerve suffered a loss of substance of half an inch. Instead of following the instructions of the older text-books on surgery, which advise amputation under such circumstances, he resected the elbow-joint and sutured the nerve ends together and the patient made a good recovery, with speedy return of sensation in the parts supplied by the sutured nerve.

Mr. Bland Sutton⁴³ made a secondary suture of the median nerve ten weeks after division, and his patient recovered perfect use of the hand. A porter sustained a deep wound of the wrist through the bursting of a soda-water bottle. The median nerve had been completely divided, and the parts supplied by it were deprived of motion and sensation below the point of section. Ten weeks after the accident the ends were found by dissection, and vivified and united by suture. Sensation began to return in five days. The most important feature in the case was the ease with which the ends of the severed nerve were found by following the rules obtained by studying the effects of neurotomy in horses. He had found that after nerve section in horses the nerve ends are connected by a band of cicatricial tissue, which when found and followed lead to the finding of both nerve ends. Both Mr. Bowlby and Mr. Holmes, in the discussion which followed the reading of Sutton's paper, expressed the opinion that in man such a guide as described by Sutton is seldom if ever found.

Mr. Sympton⁴⁴ gives an account of a wound of the ulnar nerve treated successfully by resection and suture. A girl, aged

10, was admitted into the Lincoln County Hospital on July 12, 1886, with loss of power and sensation in the parts supplied by the left ulnar nerve, due to a wound inflicted in the previous February through her having fallen upon a portion of broken jug when descending the stairs. On admission a scar a quarter of an inch in length was seen to run transversely across the course of the nerve and an inch and a half below the internal condyle. Sensation was lost in the little finger, but not in the ulnar side of the ring-finger. Muscles supplied by the nerve below the point of division were much wasted. On July 17, the patient being under the influence of chloroform, after Esmarch's bandage had been applied, a longitudinal incision was made for an inch and a half along the course of the nerve, taking the cicatrix as its centre. On exposure the nerve was found to have been completely divided and its extremities united at an angle, so that the upper one, which was markedly bulbous, overlapped the lower. The nerve-ends were resected and united by three chromicized catgut sutures. External wound drained, sutured, and dressed antiseptically. For the first week the case progressed satisfactorily, but afterwards the wound suppurated, and ultimately healed by granulation, so that the patient did not leave the hospital until August 30, when there was slight return of sensation in the little finger. A number of months later sensation and motion in the muscles supplied by the sutured nerve were perfect, and the atrophy had almost completely disappeared.

At a meeting of the Société de Chirurgie, M. Tillaux⁴⁵ related the case of a man in whom division of the median nerve, the result of an accident in 1883, had caused loss of sensibility, partially of movement, and various alterations in the region supplied by the nerve. Tillaux recently sutured the two ends of the divided nerve and three hours after the operation there was a partial return of sensibility. The patient recovered completely and movement is as good now (April, 1887) as on the affected side.

Ledderhose⁴⁶ treated a man 32 years of age during the month of November, 1884, for a compound dislocation of the elbow joint, caused by torsion in a thrashing machine. Suppuration followed, during which a portion of the internal condyle of the humerus separated and was removed. After healing by ankylosis had finally taken place, it became evident that the

parts supplied by the radial nerve were paralyzed. The patient was admitted into the hospital April, 1885, when it was ascertained that the paralyzed muscle had undergone considerable degeneration. Secondary suture on 10th of the same month. The ends of the nerve were found bulbous and firmly united with the surrounding tissues, and when the forearm was brought at a right angle with the arm they were distant from each other 6–8 cm. By flexing the elbow point acutely they could be approximated sufficiently for suturing. The ends were vivified in an oblique direction and united with fine silk sutures. A few fixation sutures uniting the nerve and surrounding soft parts were added. Healing of wound by primary union. The function of the muscles was restored slowly but perfectly. After a year electro-motility and sensation were found normal. A rapid cure after secondary suture of the ulnar nerve has very recently been recorded by Mr. Jemken,⁴⁷ an English army surgeon. A soldier was admitted into hospital on June 24, 1887, in the following condition: The little and ring fingers of his right hand were cold and paralyzed, with some superficial vesicles and excoriations. The history was that he had received two or three cuts on the front and ulnar side of his forearm near the wrist seven months before. The wound had severed the ulnar artery and nerve. Muscles below point of section atrophied; complete loss of sensation in the territory supplied by the ulnar nerve below the wound. On July 30, 1886, secondary suture was performed by making an incision through the cicatrix parallel to the nerve. After a long and tedious dissection the ends were found separated by an interval of about an inch. The ends were vivified, and by forcibly flexing the wrist it was found possible to bring them in contact by horse-hair sutures. The hand was immobilized in a position of extreme flexion. Two days after operation sensation had returned to the affected fingers in great part. Motion and sensation returned completely, and under the influence of faradization the atrophy also disappeared.

Mr. Bloxam⁴⁸ operated on the ulnar nerve of a man 20 years of age who was admitted into Charing Cross Hospital October 18, 1884, complaining of gradual wasting of the left hand. Some seven months previously, he said, he was struck by a bottle just above the internal condyle of the humerus, inflicting a deep wound

about an inch in length. The wound healed in about three weeks, but for three months after the accident he was unable to straighten the two outer fingers of that hand. He first noticed the wasting of the hand, accompanied by rheumatic pains, about six months after the infliction of the wound. On comparing the affected hand with the other it was found to be markedly smaller and thinner, owing to wasting of the interosseous muscles. The thenar eminence was less prominent and there was a depression along the inner side, starting from the root of the thumb. A few days after admission the nerve was exposed and found embedded in the cicatrix. The nerve was found only partially divided, hence it was not deemed expedient to resort to resection and suture; it was therefore only isolated from its cicatricial surroundings and the wound closed. It healed readily and when the patient left the hospital the pain had ceased, and the muscles showed a tendency to resume their normal size. It is probable that in this case isolation of the nerve from the cicatrix acted in the same manner as resection and suture, as when it was freed from its imprisonment the divided fibers were placed in a more favorable condition for the reparative process.

A very valuable contribution to the literature of secondary nerve suture has been made during the last year by Dr. Ehrmann,⁴⁹ in which he has collected in a systematic manner all secondary operations on the radial nerve up to date. As it is impossible to give a satisfactory abstract of this paper the reader is referred to the original, which contains many facts and suggestions that should be read by every surgeon.

IX. EXTIRPATION OF NERVE TUMORS.

The extirpation of a tumor involving the entire thickness of a nerve of considerable size is always a hard task on account of the difficulty which the surgeon experiences in coaptating the nerve ends after the excision. This difficulty in suturing after a loss of substance produced by resecting the nerve with the extirpation of the tumor will be proportionate to the length of the piece of nerve removed, and is also greatly influenced by the anatomical location of the diseased portion of the nerve. If the tumor involves a portion of nerve near a movable joint, suturing after resection is greatly facilitated by position of the limb; thus if the nerve is

located on the flexor side, acute flexion of the joint and immobilization of the limb in this position will greatly favor both the suturing and the process of repair of a nerve shortened by resection.

Distance Suture of Nerves.—In cases of primary nerve suture after considerable loss of substance by injury or the extirpation of a nerve tumor, and in cases of secondary nerve suture with great retraction of nerve ends, it has been the desire of surgeons to interpose between the nerve ends some substance which might serve as a temporary bridge for the products of tissue proliferation from the nerve ends until the definitive healing process should be completed. For this purpose rubber tubing, catgut, fragments of tendon, muscle, and spinal cord have been used in experiments on animals. Assaky and Fargin⁵⁰ made such experiments upon the application of distance sutures to nerves. They interposed between the two ends of the divided nerves fragments of tendon, muscle and spinal cord. The mechanical conditions thus secured had great influence in the regeneration of nerve tissue; catgut yielded the best results; silk threads remained indefinitely in place and became encapsulated without taking any part in the reparative process. In every case where the intervening bridge was examined microscopically the cicatrix contained connective tissue, but also a great quantity of nerve fibers. This operation then seems to be indicated when the opposition of the two ends of the divided nerve is impossible, and also after certain surgical operations, as the resection of a nerve for neuroma. One of the greatest obstacles to the restoration of the continuity of a nerve trunk after division is the interposition of permanent cicatricial tissue between the nerve ends, and this condition can at least be partially prevented by a distance suture made of an absorbable material, as catgut for instance, which in the course of time is removed by absorption and substitution of new tissue from the nerve ends.

Mr. Bowlby⁵¹ relates the case that came under the observation of Verneuil, where a neuroma developed in the median nerve after a fracture of the humerus. A man, aged 26, was admitted to the Hôpital La Pitié on December 30, 1882, on account of severe pains in the right forearm. His history was that at the age of seven years he had sustained a compound fracture of the lower end of the right humerus, and that the arm had always been in a weak condition and the elbow had been stiff. On admission there was

found to be on a level with the site of fracture a small oval swelling the size of an almond, situated apparently on the median nerve. Pressure on the swelling caused pain referred to the thumb, index and middle fingers. Sensation in these three fingers was also much impaired. Muscles supplied by the median below the point of injury much wasted, but not completely paralyzed. The temperature of the hand on the affected side was 4.5° below that on the opposite side. On January 15, 1883, Verneuil removed the tumor by operation, completely cutting out the portion of median nerve from which it grew, and not stitching the cut ends, but leaving them widely separated. The tumor itself was found to be a fibroma, separating the nerve tubules, and by its pressure destroying some of the nerve bundles. After the operation the temperature of the hand on the side on which the operation had been performed,—*i. e.*, the right was 34° , of the left 30° . The day after the operation the temperature of the right hand was 35° , and of the left 25° . Sensation was still further lost, but was nowhere entirely absent. The further history of the case is not given. Dr. McBurney presented a patient to the New York Surgical Society, November 23, 1887, 27 years of age, who had been admitted into St. Luke's Hospital on February 8, 1886. There was no cardiac, renal, or syphilitic history. Six years before he had noticed a lump on the inner side of the right arm, which had given rise to no pain until a month before his admission. A fusiform-shaped tumor was found on the inner aspect of the right arm, at about its middle third, between the biceps and triceps muscles. Pressure upon the tumor caused pain in the hand and forearm, but not in the tumor itself. On February 16th the tumor was removed. It was of fusiform shape and as large as a pear. It was found immediately beneath the deep fascia and was seen to involve the median nerve. The fibres of the nerve were spread in the form of a sheath over and around the growth on all sides, very much like the network over a balloon. The nerve sheath was incised longitudinally without dividing any nerve bundles, and the tumor was carefully enucleated. A few bundles of considerable size ran through the substance of the tumor. These were necessarily divided; two of them were subsequently sutured with catgut. Three smaller tumors of an appearance similar to the first were imbedded in the median nerve just above the principal mass.

These were also enucleated. The wound was drained, sutured and dressed with antiseptic gauze. After the operation the patient had neuralgic pains in the hand and arm, corresponding to the distribution of the median nerve, and a few trophic disturbances, but sensation was not impaired. Nearly two years had elapsed since the operation, and the patient had complete use of the arm, the only remaining symptom being a slight tingling sensation in the right index finger. No signs of local return. Under the microscope the tumor was seen to be composed of connective tissue and spindle-shaped cells, the latter being very abundant. Numerous vascular channels could be seen in every section, being limited to the tumor tissue. The diagnosis made, therefore, was fibro-sarcoma. The existence of secondary tumors on the proximal side of the first growth would certainly suggest that the diagnosis was correct, and yet it is somewhat difficult to understand that simple enucleation of the tumors should not have been followed by a relapse within two years after the operation, if the tumors were malignant. How prone a sarcoma of a nerve or nerve sheath is to return after operation, is well shown by a case reported by Dr. Briddon after presentation of Dr. McBurney's case. He said that in 1859, by invitation of the late Prof. Willard Parker, he had operated at his clinic, at the College of Physicians and Surgeons, for the removal of a tumor involving the brachial portion of the right ulnar nerve, measuring three inches in its longitudinal, and an inch and a half in its transverse, diameter. It was seated within the nerve sheath, nerve filaments passing through and over it. Dr. Draper examined it under the microscope and pronounced it a fibro-sarcoma. A year later the cicatrix was occupied by a large fungous mass, which bled freely when touched. At this time amputation was performed at the shoulder joint. The disease returned again in the stump, starting from the divided nerve ends, and Dr. Parker performed excision of the tumor with the ends of the affected nerves. Recurrence again took place when the late Dr. Gurdon Buck resected the scapula and a portion of the clavicle. Another recurrence terminated the case.

At the same meeting Dr. Briddon reported another case that he saw in 1885,—a woman who had suffered severely for 25 years from neuralgia involving the right musculo-spiral nerve. It had commenced in the gangliform enlargement of the posterior in-

terosseous branch, over the back of the wrist-joint, and had then radiated over all the territory supplied by the nerve. In the axilla there was a tumor of about the size of a billiard ball, situated at about the center of the space, bulging the interior wall slightly, but the floor scarcely at all. It was removed by operation, and after microscopical examination diagnosticated as a myxoma.

Dr. Cameron⁵² removed a spindle-shaped tumor from the substance of the sciatic nerve. After the operation the cut ends of the nerve were united by sutures, but it was found impossible to bring them closer than about an inch. He reported that the case had done well so far, but there was yet no return of muscular power.

Socin⁵³ reports two cases of neuroma operated on by excision and nerve suture. A gymnast, 20 years of age, was stabbed by his comrade with a pocket-knife in the left arm February 23, 1886. Short convulsive pain, slight bleeding from the wound. Motion and sensation in the distribution of the musculo-spiral nerve completely suspended. The wound was sutured, but opened subsequently on account of suppuration, which continued for about six weeks. Sensibility had returned to a great extent, but no signs of improvement in the motility. When admitted into the hospital August 6, a cicatrix two inches in length was found about two inches above the external condyle. A little to the front of the cicatrix a hard nodule, tender on pressure, could be felt through the muscles. Forearm slightly atrophic. Hand flexed toward palmar side, almost at right angles. Electric irritability to faradic current absent in all muscles supplied by the injured nerve. Only a small anæsthetic point on the back of the hand, surrounded by a hyperæsthetic zone. Operation August 9, 1887. After exposing both ends of the nerve it was found that the termination of the proximal end consisted of a neuroma the size of a pea, which was connected with the peripheral end by a thin string of connective tissue. The neuroma was excised, the peripheral end vivified and the parts brought together by sutures. Wound healed by first intention in 19 days. At date of discharge no improvement in the muscles. In December of the same year the supinator longus and radialis externus responded to the faradic current. In April, 1887, great improvement was noticed. In August, 1887, almost perfect use of hand. Functional disturbances only very slight.

The second case was a carpenter, 19 years old, who injured himself with an axe over the inner aspect of the right elbow-joint, May, 1885. Wound healed without any special treatment. Gradual atrophy of the muscles of the ball of the thumb and little finger and the interossei. Admitted into the hospital May 10, of the following year. A cicatrix three ctm. in length was found over the inner side of the elbow-joint between the internal condyle and the olecranon process. The interossei, adductor pollicis, and the muscles of the ball of the little finger atrophic. The fifth and ulnar side of the fourth finger anæsthetic. Operation March 13, 1887. The ulnar nerve was exposed, and on examination it was found divided, with the exception of a bridge 3 mm. in width,—upper end of divided portion terminating in a neuroma of a bulbous shape. The neuroma was excised, peripheral end vivified and the parts united by sutures. Wound healed without suppuration in ten days. At the time of his discharge from the hospital, March 23, no improvement could be noted. A letter from him, dated July 3, 1887, brought the information that great improvement had taken place.

Tillaux⁵⁴ found, in a woman, where he made a secondary suture of the median nerve immediately above the wrist-joint $4\frac{1}{2}$ months after the injury, that the upper end of the nerve was the seat of a neuroma of considerable size, and firmly attached to the surrounding tissue. The bulbous portion was excised, the distal end vivified and the continuity of the nerve restored by suturing. Although the wound suppurated, improvement in the sensibility of the distal parts was noticed a few weeks after the operation. This case is of special interest, as at the time of operation it was seen that from the bulbous portion new nerve filaments projected, but instead of in the direction of the peripheral end, they invaded the sheath of the palmaris longus. Amputation neuroma have been described as a product of excessive tissue proliferation on the part of the proximal end to form a union with an absent peripheral end; and a neuroma of a completely or partially divided nerve trunk must likewise be looked upon as a hyperplastic regenerative process usually surrounded by conditions which are in the way of a normal process of repair. As a neuroma is composed largely of the products of an interstitial plastic inflammation, its tissue is not well adapted for restoration of anatomical continuity and func-

tional activity, and it should therefore be excised if it occurs in the continuity of a partially divided nerve, or upon the extremity of a completely divided nerve prior to secondary nerve suture.

X. NEURECTOMY.

Dr. G. R. Fowler⁵⁵ states that obstinate peripheral neuralgias of the fifth cranial nerve are likely to yield to neurectomy of the trunk or trunks innervating the painful area. In these cases neurectomy should be done at the point at which the nerve makes its cranial exit. In cases of central origin, limited neurectomy, with nerve-stretching, should first be done in the hope that degeneration thus set up, together with rest gained by interrupting the centripetally conducted stimuli, may favorably influence the diseased central organ. If relapse occur, this may be repeated, provided rest thereby is gained and corresponds to the length of time which Waller has shown to be required by the process of degeneration and regeneration. If no relief be gained, a similar operation should be performed upon all of the fifth nerve divisions. This failing, complete neurectomy of each division accessible should be done. Ligature of the common carotid may be finally tried. In doubtful cases, complete neurectomy followed by relapse, by ligature of the external and common carotid in turn gives the best prospect. Complete neurectomy of the second branch of the fifth necessarily involves extirpation of the spheno-palatine ganglion. To this is to be attributed any increasing immunity from relapse claimed for Carmochan's operation.

At the last meeting of the Naturforscher und Aerzte, in Wiesbaden, Lossen,⁵⁶ of Heidelberg, reported a case of long-continued and inveterate neuralgia of the right trigeminus which not only required resection of all branches of the fifth nerve, but necessitated a second neurectomy of the infraorbital and inferior maxillary branches on account of recurrence of the pain. In making the second operation on the infraorbital nerve, a genuine neuroma, one-half of a centimeter in diameter, was found in the canal which had during the first operation been laid open with a chisel. The patient recovered completely after the last operation. Dr. Grisson, of Rostock, remarked that it would be desirable to ascertain the condition of patients submitted to operation for neuralgia of the second and third branches of the fifth nerve a considerable length

of time after the operation, as the utility of the various operative procedures for these nerves had not been fully proven and that the technique of these operations is capable of improvement. He gave an account of five operations performed on three patients by Professor Madelung. In all cases a cure of the neuralgia was obtained, which had lasted in one case over two years, in another case nearly two years, in one one year, and in two cases four months. In four cases of neurectomy of the second branch of the fifth nerve, Braun-Lossen's modification of Leucke's operation was employed. Hemorrhage should be carefully arrested in these operations, and if this cannot be readily done, he advises that the operation should be abandoned, the wound packed with iodoform-gauze and the operation completed after two or three days.

Lichlau⁵⁷ in his dissertation describes a neurectomy of the third branch of the fifth nerve performed by Maas. Linhart's method was partly followed and the operation performed as follows: A vertical incision 5 cms. in length was made one inch in front of the posterior margin of the ascending ramus of the jaw. The inferior dental canal was opened with a chisel to the extent of half an inch and about an inch of the nerve was removed through the opening. Another incision, one inch and a half in length, was made along the lower border of the inferior maxilla at a point below the mental foramen. The nerve at its point of exit from this foramen was seized with forceps, and the entire nerve, three inches in length, pulled out of the canal. The patient was 44 years of age and had suffered from neuralgia of this branch for 7 to 8 years. The wound healed rapidly, and when the patient left the hospital he was entirely free from pain.

At a meeting of the Medical Society of Prague, Dr. Bayer⁵⁸ presented a man 39 years of age who had been operated on by Gussenbauer for a severe neuralgia of all three branches of the fifth nerve. Resection of the second branch was made according to a method original with Gussenbauer, consisting of a temporal resection of the malar bone with a portion of the zygomatic process of the upper jaw; this osteo-plastic flap was reflected outward, giving ample room to resect the nerve at its point of exit from the skull. After the resection the flap was replaced and fixed in its place by suturing. The operation in this case was a perfect success, the patient remaining free from all pain when last heard from, some

time after he had left the hospital. Recent experience seems to demonstrate the superiority of some form of osteo-plastic resection of the malar bone over all other operative procedures in resection of the second branch of the trifacial nerve.

XI. NERVE SPLITTING.

Under this name an operation has been described by Mr. McLeod³⁹ in connection with the treatment of a case of chronic neuritis and perineuritis. A Hindoo, aged 25 years, suffered from syphilis 12 years ago. Received a severe injury of the dorsum of the right hand two years ago, followed by an inflammatory swelling and gradual loss of sensation over the inner side of the hand. The ulnar nerve was indurated and thickened above the elbow. The musculo-spiral nerve could be felt thickened at a point where it winds around the humerus. There was loss of sensation in the little and ring fingers, as well as over the palm and dorsum of the ulnar side of the hand. He complained of tingling sensations over the inner side of the forearm. No trophic lesions of the skin below the seat of injury. Muscles supplied by the ulnar nerve atrophic. Little finger rigidly flexed, and the ring finger partially so. The ulnar nerve was exposed to the extent of four inches above the elbow. The sheath was found congested and thickened. It was carefully split in the direction of its longitudinal axis to the full extent of the external incision. The edges of the wound in the nerve gaped. The nerve was also stretched. The wound was sutured with horse-hair and dressed antiseptically. It healed by first intention. The patient remained in the hospital 17 days. The tingling sensations disappeared promptly, sensation during this time returned partially, and the fourth and fifth fingers became more flexible. Anæsthesia of these fingers still remained.

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SURGERY OF THE ABDOMEN.

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THE records of the past year show great activity in all that concerns the Surgery of the Abdomen. Experimental research, conducted by accurate and painstaking observers, has established certain points hitherto undecided, while clinical observations, preserved in careful reports, have contributed largely to the knowledge already gained. The methods of operative procedure have been greatly improved and the details so well defined as to assure successful results when faithfully carried out. The careful study of symptoms has greatly advanced knowledge in the direction much needed, that with regard to diagnosis, so that the field of diagnostic laparotomy has been lessened. The brilliant results obtained in Cerebral Surgery, accomplished largely through the study of symptoms, thus leading to correct diagnosis, has stimulated surgeons who perform operations upon the organs of the abdominal cavity to increase and define their knowledge in this respect. Accurate clinical study grafted upon a knowledge of anatomical relations of structure and of functions has led to a greater perfection in diagnostic skill. While it must be admitted that the absence of well-defined symptoms and the intimate relations of the various organs of the abdominal cavity make accurate diagnosis in some instances of disease and injury very difficult, if not impossible, yet the daily increasing knowledge is gradually clearing away the difficulties and establishing fixed points in diagnosis. The Surgery of the Abdomen is claiming more and more the attention and the trained skill of the general surgeon who brings to bear upon the subject the experience gained in other departments of his art. Moreover, the knowledge and careful attention which its practice demands is leading to the better education of those who would work in these fields.

GENERAL CONSIDERATIONS WITH REGARD TO OPERATIVE PROCEDURES.

Increasing experience demonstrates that the best results are obtained in operations upon the abdominal cavity when they are performed under rigid antiseptic methods. Abroad, this question may be said to have passed beyond the pale of discussion and in this country it is gradually, but surely, approaching a favorable solution. The methods are each day being simplified, and in this way it becomes in the power of surgeons even in locations most remote to employ them. With very few exceptions the medical schools of this country give full instructions, didactically and clinically, upon this subject and their graduates are sent forth imbued with the principles and prepared for the practice of antiseptic surgery. It may be truly said that the great achievements in abdominal surgery could have been accomplished only through its methods. The charge of complex character cannot stand to-day since, in its highest refinements, it exists in its simpler forms.

LINE OF INCISION.

The question with regard to the point at which the section of the abdominal wall should be made to gain entrance most readily and obtain most freedom of action has claimed attention in the contributions which have appeared during the past year upon abdominal surgery.

Dr. McGraw¹ in a paper read before the American Medical Association, June 8th, 1887, upon "Some Points in Laparotomy for Visceral Injuries" discusses, at some length, the nature of penetrating wounds of the abdomen, and divides, for the purpose of operative procedures and with respect to visceral injuries, the viscera of the abdominal cavity into two classes,—movable and immovable. In the first class he places the spleen, pyloric ends of the stomach and the duodenum, the transverse colon, the ileum and jejunum, the sigmoid flexure and ovaries; in the second class, the liver and gall-bladder, the kidneys and supra-renal capsules, the cardiac portion of the stomach, the lower three-fourths of the duodenum, the pancreas, the ascending and descending colon and rectum, the uterus and bladder. The author discusses the question fully and arrives at the conclusion that those in the second class are so immovable "as to forbid operations upon them through the

median line, and, when wounded, the external incision should be made with reference to that fact." Theoretically, the views advanced by the author of the paper are in the main correct; the experience of operators, however, has conclusively shown that in such injuries as he discusses a thorough examination of the abdominal cavity and of its contained viscera is imperative, and this can be best accomplished by the median incision, which, if need be, can be made to extend from ensiform cartilage to pubes.

The linea alba is the anatomical line of separation between the two halves of the abdominal wall, and the tissues of which it is composed are such as to facilitate prompt union after section. In operations for morbid conditions of the liver and gall-bladder, these organs may, in some instances, be rendered more accessible by incision outside of the median line. In cases in which there is relaxation of the abdominal wall, median incision will expose them sufficiently for operative purposes.

MEDICO-LEGAL CONSIDERATIONS.

The medico-legal aspects of the question of laparotomy in traumatism of the abdominal viscera has received very elaborate treatment at the hands of Dr. Nancrede,² who presented this subject for discussion in a paper read before the American Surgical Association, at the meeting held May 14th, 1887. In criminal cases this question is one of supreme importance, since efforts have been made by counsel in such cases to place the responsibility of fatal issue upon the surgical interference, and claim acquittal of the full punishment of their clients for their crimes. The chief object of Dr. Nancrede in presenting the question to the Association for consideration and decision, was to obtain an "authoritative opinion from the highest surgical tribunal of the country." Laparotomy for such injuries, the author states, had been endorsed in most emphatic manner by two societies,—one purely surgical in character,—and guardedly, by the American Medical Association. While the opinion of the Surgical Association did not assume official promulgation in resolutions, it was evident from the discussion which ensued that the consensus of opinion was in favor of operation in criminal cases. The present state of our knowledge upon the surgery of the abdomen has settled this question. Experience has shown in these cases that

life can be saved by operative interference and that we cannot wait for time to determine the diagnosis, but that it must be made by exploratory operation. As having most important bearing upon this question, the author of this paper is able to place on record a case communicated to him in which counsel claimed exemption for his client from full punishment for his crime on the ground that the surgeon did not perform laparotomy, suture the wounds of stomach and liver which were found post-mortem to have been made by the knife used by his client. The report of the case, by Mr. Payne, medical student, is as follows:—

Frank S. received on July 4th, 1887, a stab-wound of the abdomen, one inch and a half below the ensiform cartilage, which penetrated the anterior wall of the stomach just below the lesser curvature to the extent of about one inch and also the left lobe of the liver to the extent of an inch and a half, the latter not exceeding three quarters of an inch in depth; from the effect of these injuries he died on the 9th of the same month. After the post-mortem examination the coroner returned a verdict of “Death due to peritonitis caused by the escape of the contents of the stomach and effused bile.” On trial the defendant pleaded that the practice was mal because the attending physician did not open the belly, and repair the wounded viscera. The jury, however, returned a verdict of murder.

MATERIAL TO BE USED FOR LIGATURES AND SUTURES IN INTRA-PERITONEAL WOUNDS.

Experimental research has shown that the peritoneum, in a state of health, will not only tolerate the presence of a foreign body, but will protect itself against harm through a process by which such bodies become encapsulated. The determination of this fact has been of great assistance in the selection of the proper material to be used in the cavity of the abdomen for ligatures and sutures. In the earlier operations animal ligatures were usually employed on account of their disappearance by absorption. The occurrence in some instances of secondary hæmorrhage after their use has more recently directed attention to and secured the employment of silk ligatures. For the purpose of sutures this material has been used in preference to any other by reason of its durability and easy manipulation. In the closure of

the abdominal wound the silk suture has largely taken the place of the metallic silver, iron or copper, formerly so much in vogue. The method of closure by deep silk sutures with intervening animal sutures is most efficient and in general use. Dr. S. W. Gross³ exhibited at the meeting of the Philadelphia Academy of Surgery held Dec. 5th, 1887, a specimen of vesical calculus removed *per urethram*, from a patient upon whom ovariectomy had been performed some time before. The nucleus was a portion of silk ligature with which the pedicle had been ligated and which had ulcerated into the bladder. Lithotripsy had been previously performed and the nucleus of the calculus which was then crushed, was found to consist of a larger portion of silk ligature. In his remarks, Dr. Gross spoke of the occurrence as showing one of the disadvantages of the use of the silk ligature in tying the pedicle after ovariectomy. It may be questioned whether an accident so rare as that described should weigh against the greater safety of the silk ligature in the control of intra-peritoneal hæmorrhage.

EXPLORATION OF THE ABDOMINAL CAVITY THROUGH THE COLON.

Dr. P. Morris⁴ reports a case in which, for fecal accumulation, he divided the tissues of the anus back to the coccyx and after removal of the mass he could introduce the arm up to the axilla and "investigate and manipulate every part of the abdominal cavity." This case is mentioned incidentally in view of the advantage gained by the anal incision and the suggestion of the employment of this method in certain cases as a means of diagnosis in the place of laparotomy.

SEPTIC CONDITIONS FOLLOWING ABDOMINAL SECTION AND THE MEANS OF REMOVING THEM.

The experiments of Wegner⁵ show that bacteria and micrococci injected into the peritoneal cavity promptly enter the blood-vessels and lymph channels and thus go to the excretory organs. Lawson Tait⁶ states that he finds the most efficient remedy for septic conditions following abdominal section to be 30 or 40 grains of the sulphate of magnesia repeated every hour or every other hour until the bowels move. Hence, where the microbes accumulate in such quantities that nature, unaided, cannot remove them, it is the part of rational treatment to render assistance by

purgatives and diuretics which accomplish drainage nearly as efficiently as that employed from the abdominal cavity.

PREVENTION OF ADHESIONS AFTER LAPAROTOMY.

P. Muller⁷ reports a case of adhesion between the abdominal walls with the inclusion of a knuckle of intestine, following laparotomy in which there were extensive wounds of the peritoneal surfaces. To prevent the formation of these adhesions, he advises the avoidance of bandages in such cases, and further, the filling of the abdominal cavity with a sterilized neutral solution. He employed this method in one case with success, using a 7 per cent. solution of salt. The artificial ascites was removed by the sixth day though the occurrence of profuse diaphoresis and diuresis. The patient, soon after the filling of the cavity, was seized with dyspnoea and great elevations of the pulse up to 150. The employment of the large quantity of the solution in this case, 2400 grams, the operator thought unsafe, and suggested the injection of small quantities through a double canula every three hours or by permanent irrigation.

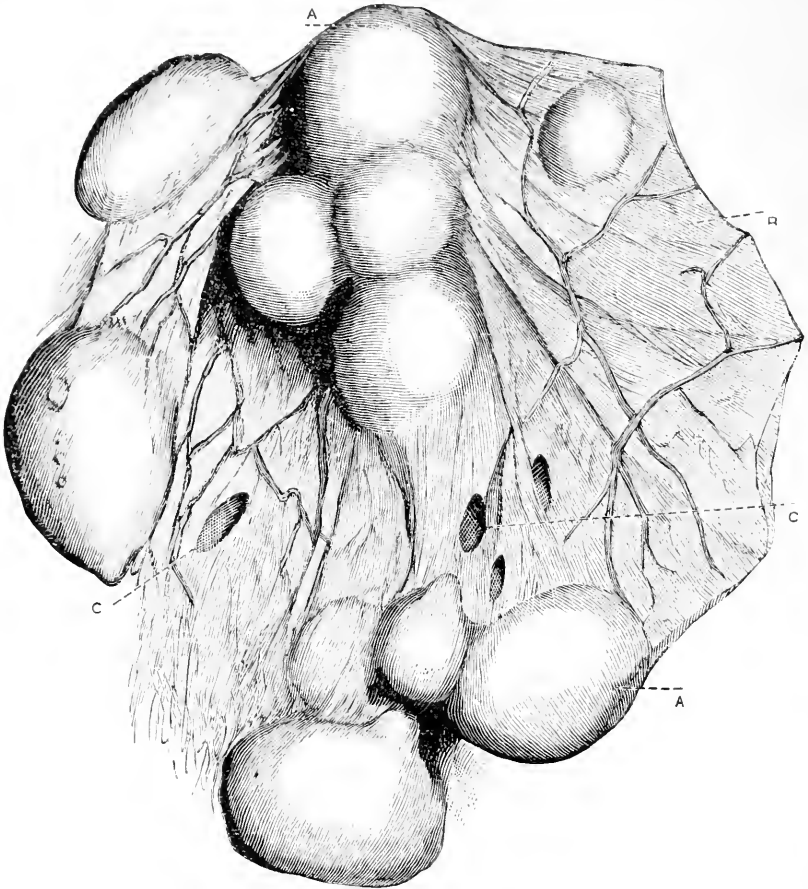
DRAINAGE OF PELVIC ABSCESES BY TREPHINING THE PUBIC BONE.

In connection with the question of accomplishing the most efficient drainage of the abdominal cavity in cases where suppuration exists, it will be of interest to note the method practiced by Prof. Rinné⁸ in abscesses involving the pelvic cavity. In one case reported an opening about one inch in diameter was made in the bone, the incision through the soft tissues being close above the great trochanter. The abscess cavity was carefully scraped, washed out with solution of salicylic acid and a drainage-tube inserted. Prof. Rinné considers the method available in cases in which the abscess is developed in the concavity of the os pubis itself.

LAPAROTOMY FOR CONDITIONS INVOLVING THE PERITONEUM.

Multiple Hydatid Cysts of the Abdomen.—J. Potocki, hospital interne, presented the specimen to the Société d'Anatomie and reported a case of multiple hydatid cysts of the abdomen for the relief of which M. Bouilly⁹ performed laparotomy. The patient had been admitted to the medical wards of the hospital under the care of M. Hutinel with the diagnosis of pulmonary phthisis. An

abdominal enlargement which existed was regarded as a fibroma. She had had previously attacks of hæmoptysis, expelling at the same time what as she described as whitish, pearl-like bodies. A month following her admission into the hospital, the occurrence of hæmoptysis took place with an ejection of masses which were shown on microscopic examinations to be hydatid cysts. A more



MULTIPLE HYDATID CYSTS OF THE ABDOMEN.—(*Revue de Chir.*)

careful examination of the abdominal tumor was now made and paracentesis was performed, removing a colorless fluid in which were found hooklets and echinococci. After the determination of the nature of the abdominal swelling, the patient was transferred to the surgical ward of M. Bouilly, who proposed its removal by laparotomy. Physical explorations showed an abdominal swelling

below the line of the umbilicus, and the presence of numerous elastic tumors, the size of an egg, very movable, as if pedunculated. Vaginal examination revealed a voluminous mass posteriorly in the *cul-de-sac*. The hydatid fremitus could not be detected. On opening the abdominal cavity, the omentum was found to be studded with cysts the size of turkey eggs and was ligatured and removed *en masse*. (See fig.) The cysts occupying the pelvic cavity and connected with the uterus were enucleated with the finger nail, the fibrous tunic enveloping them being extirpated. During the removal, a number of cysts were ruptured and their contents poured into the cavity. After each rupture, and at the close of the operation, the cavity was freely washed out with warm water. Twelve or fourteen carbolized silk ligatures were applied, a careful toilet of the peritoneum made, and the cavity closed by superficial and deep silver-wire sutures. Iodoform dressing was applied and held in position by a bandage. Twenty days after the operation the patient left the bed and in four days quitted the hospital with evidence, apparently, of some cerebral disturbance which suggested the possible formation of hydatid cysts in the brain. The case presented anatomical and clinical points of interest in the rare occurrence of hydatid cysts in the peritoneum, the multiple character of the formation, and the prompt recovery after performance of the radical operation of complete extirpation.

TUMOR OF THE OMENTUM.

Lipoma.—At a meeting of the Clinical Society of London, Apr. 22d, 1887, Mr. Meredith¹⁰ read the notes of a case of the successful removal of a large omental lipoma. Under the belief that the tumor was ovarian in character, the abdomen had been opened by another operator and closed without any attempt being made to effect the removal of the growth. On admission to the Samaritan Free Hospital, eighteen months later, the diagnosis of omental tumor was made, chiefly on the ground of its comparative mobility and the absence of intestinal resonance in front of the mass. The growth overhung the pubes and groins without invading the pelvic cavity. Laparotomy was performed and the growth removed by enucleation *en masse* from its omental capsule without serious difficulty. It weighed $15\frac{1}{2}$ pounds and consisted of dense globules of fat with a scanty amount of fibro-cellular tissue. Patient

recovered well and left the hospital on the 24th day after the operation.

RETROPERITONEAL TUMORS.

At the meeting of the Association of Physicians held in Cologne, Bardenheuer¹¹ discussed the origin and methods in operations in retroperitoneal tumors. He stated that these growths took their origin either from the retroperitoneal connective tissue, not from the fascia, or from one of the retroperitoneal organs,—the kidneys, supra-renal capsules, pancreas and abdominal aorta. Of ten instances under his observation, two took origin from the kidneys, two from the supra-renal capsules, two from the retroperitoneal connective tissues of the renal fossa, two from the pancreas, two from the true pelvis, one from the retroperitoneal connective tissue near the bladder, and one behind it. Out of these there were two operations for kidney extirpations, one for sarcoma of the supra-renal capsule, one for simple sarcoma of the retroperitoneal connective tissue and a second which originated from the aorta. In cases of carcinoma of the pancreas, retroperitoneal exploratory incision was made demonstrating the presence of metastatic growths in the liver. The extraperitoneal method of performing these operations has the preference in the slight hæmorrhage which ensues and in the fact that the operation is easy of execution in spite of the most colossal expansion of the growths. Death occurred in two cases in consequence, in one, of the employment of defective means to check hæmorrhage and in one on account of ligature of the aorta.

PERITONITIS.

At the meeting of the College of Physicians of Philadelphia, held June 2, 1875, the author of this paper reported a case of encysted dropsy of the peritoneum in which the abdominal cavity had been opened, large quantities of pus evacuated and the subsequent treatment conducted to a successful termination by washing out the cavity with weak carbolized solutions injected through a large flexible catheter. The abdominal swelling had followed an attack of puerperal inflammation, at first quite small and localized. For a period of six years it remained quiescent, then assumed quite large dimensions and seriously involved the health of the patient. The nature of the enlargement being obscure, an

operation of exploration was advised and the pus found encysted, occupying a cavity in which the omentum and the intestines, glued together by adhesions, formed the walls. In the remarks which accompanied the report of the case, the author stated that the question as to the proper treatment to be adopted in these cases is one of importance, and he could not conceive of any treatment leading to a successful result other than that which should promptly give exit to the purulent fluid and prevent its accumulation. Incision and washing out the cavity, as practiced in this case, he strongly urged as the proper method of treatment. This case may be fairly regarded as one among the first recorded in which the method of treatment, now so universally accepted and practiced, was carried out in inflammatory conditions of the peritoneum. Since that time the accumulated experience of surgeons has shown that operations may be performed upon the abdominal cavity during the existence of acute inflammation of the peritoneum and with positive curative effect upon that condition. Every variety of peritoneal inflammation has been submitted to the test of this method of treatment. The different varieties of peritonitis in which operative interference is indicated may be classified in the following groups:—

Peritonitis supervening upon Escape of Contents of Viscera.

—In all cases in which the inflammation has taken origin in the wounding or rupture of viscera and the escape of the contents of these organs into the cavity, causing septic peritonitis, such as described under the head of perforative peritonitis, following perforating ulcer in typhoid fever, escape of contents of the stomach, intestine, bladder or gall-bladder as result of rupture, stab or gunshot wound. Associated with the operation for the treatment of the peritonitis in such cases, is operative treatment of the pre-existing lesion.

Peritonitis following Operations upon the Abdominal Cavity.

—In the second group may be placed those cases in which general septic peritonitis has followed operations upon the cavity for any cause. Prompt re-opening of the cavity is demanded in these cases upon the first appearance of symptoms, thorough cleansing with antiseptic solutions and provision made for free drainage. Through the means provided for drainage, repeated irrigation of the peritoneum should be made until the inflammatory action subsides.

The So-called Idiopathic Peritonitis.—It is doubtful whether the above form is entitled to separate classification. It is very strongly asserted that the existence of such a variety is evidence simply of our want of information, a cause being presented but not detected. Dr. Albert¹² classifies it as idiopathic or rheumatic peritonitis and advises operation, quoting favorable results.

Tubercular Peritonitis.—Great interest has lately attached itself to the treatment by laparotomy of this form of peritonitis. Beginning with the well known case of Sir Spencer Wells,¹³ in 1862, where an unpremeditated laparotomy operation was successful in curing a case of this form of peritonitis, we pass in review a number of similar cases adding confirmatory evidence, until we reach those in which diagnosis had been made prior to operation, excised specimens examined and the existence of the disease definitely determined by the discovery of the tubercle bacillus. The fact having been undeniably established that simple laparotomy, as done in the earlier instances, and later, laparotomy with antiseptic washings, cured tubercular peritonitis, the question as to the manner in which the operation accomplishes this result, has commanded widespread and careful study.

In a paper read before the section of obstetrics and gynecology, at the meeting of the American Medical Association in June, 1887, Dr. Van DeWarker¹⁴ discussed in an elaborate manner the subject of laparotomy as a cure for tuberculosis of the peritoneum, reciting a case in which he had performed abdominal section through a mistaken diagnosis and which was attended by prompt relief of the patient with a prospect of permanent cure. He refers at length to the labors of Hegar,¹⁵ upon the subject of genital tuberculosis. In discussing the question as to the manner in which laparotomy arrests the progress of peritoneal tuberculosis, he states "that in this variety there is a modified and peculiar form of inflammation characterized by serous and plastic exudates, which opening the peritoneal sac may have a tendency to arrest, as a series of experiments in the surgical treatment of peritonitis now being made by various surgeons prove."¹⁶ The ascitic accumulation may and probably does, prove an additional source of irritation, as apparent cure has been known to result from aspiration or tapping, equally with laparotomy. The accumulation of fluid may intensify the morbid process in two ways,—mechanically,

by pressure, or as affording a medium for the distribution of the tubercular germs. Bacilli may be found in the fluid, just as giant and polynucleated cells may be seen in the ascites of sarcoma. "The liberated cells may graft themselves on the peritoneum and pass through the diaphragm into the pleura: they behave in the same manner as bacteria."¹⁷

Hence, evacuation of the fluid secures removal of the germs and the more effectual the method, incision and irrigation, the better the prospect of cure. The irritated peritoneum is afforded rest, and encapsulation may occur by process of thickening and induration of the surface,—a condition which may take place in spontaneous cure. Calcareous masses may be formed from the tubercular nodules, as has been observed in the peritoneal covering of the Fallopian tubes.¹⁸ Dr. Van DeWarker also presents his views with regard to the form of tuberculosis of the peritoneum in which laparotomy may be expected to give the best results. According to Kaulich,¹⁹ the disease may be divided into three groups: 1. An acute form with pyrexia, without effusion, but with retraction of the abdominal walls. 2. A form in which the invasion is insidious, the progress slow and even, without pyrexia and with ascites as a prominent and early symptom. 3. This group includes the second form in which there is a decrease in the effusion, with general improvement, but only for a longer or shorter time,—the apparent spontaneous cure. Cases belonging to the second group are those in which the best results are to be obtained by laparotomy, the disease being attacked midway in its course from the genitalia to the respiratory organs. In the discussion which ensued upon the paper of Dr. Van DeWarker, Dr. A. S. V. Mansfelde, of Ashland, Neb., offered what may be accepted, in the present state of our knowledge, as the most satisfactory explanation of the relief afforded by laparotomy in tubercular peritonitis. He referred to the fact that in chronic hyperæmia of the lungs caused by some disease of the heart, tuberculosis is very seldom found to be present. He also cited the "clinical fact that whenever a cavity is cured, outside of a few instances of calcareous degeneration, the greater number of cases are cured by fibroid thickening of the surroundings of the tubercle cavity, thus stopping the progress." By the operation of laparotomy in tuberculosis of the peritoneum there is produced the same condition which occurs in cases of pro-

gressive heart disease, namely, hyperæmia and consequent strangulation of the existing growth on the surface of the peritoneum. At present we are justified in formulating the following conclusions in regard to tubercular peritonitis and its cure by laparotomy: 1. Sufficient evidence has been adduced to prove that the progress of the disease may be arrested by laparotomy. 2. That the most favorable cases for the successful employment of laparotomy are those that are placed in the second group of Kaulich, and in which the disease is confined to the peritoneal cavity. 3. That the diagnosis is to be made rather by exclusion than from the presence of any characteristic and uniform symptoms. 4. That the cure is accomplished through the production of a condition of hyperæmia which in turn is produced by incision and removal of the fluid.

Puerperal Peritonitis.—Mr. Lawson Tait²⁰ reports a case of puerperal peritonitis in which he performed laparotomy with successful result. Acute peritonitis appeared on the third day after a severe labor, and soon became general. On the fifth day there was great distension, pulse 135, hiccough and incessant vomiting. The day following, the condition of the patient was worse. Laparotomy was performed and a bloody purulent fluid was evacuated after separating the adhesions; the uterus was adherent to the pelvic bone on the right side. A glass drainage-tube was passed deep into the pelvis and the wound was closed. The unfavorable symptoms disappeared promptly and the patient recovered. The favorable result achieved in the case cited above is strong evidence of the great benefits to be derived from the employment of abdominal section, and the treatment by direct means of the inflamed peritoneal membrane. While to-day the great advances made in obstetric procedures have largely prevented the occurrence of this very grave complication of the puerperal condition, the surgeon, guided by sound judgment, should be prepared to interfere promptly in these cases and thus arrest the progress of a condition which other methods of treatment have been powerless to control.

Purulent Peritonitis of Gonorrhæal Origin.—In this case, reported by Dr. E. Ceppi,²¹ of Porventruy, laparotomy was performed and drainage effected with a successful result. The interesting feature connected with the case was the discovery of small accumulations of Neisser's gonococci in the pus cells. Similar

microbes, diplococci, consisting of ovoid cells, measuring 0.85 m. were found in the discharge from the uterus. This is stated to be the first case recorded in which the gonococcus has been found in the peritonitic exudation.

INTESTINAL TRACT.

Operations upon the Stomach and Intestines.—The most generous contributions have been made to the current medical literature of the past year upon the various operations performed upon the stomach and intestinal tract. Much valuable information has been added to the stock of knowledge upon this very important part of abdominal surgery by the careful study and record of cases. Experimental research has opened new fields for practical work and contributed much toward the settlement of questions under discussion. A most important contribution to intestinal surgery has been made by Prof. N. Senn, of Milwaukee, who, after a long series of carefully conducted experiments, presented his conclusions in an elaborate and exhaustive paper read before the surgical section of the 9th International Medical Congress. The conclusions arrived at from his experiments and forcibly presented in his paper, will undoubtedly be of supreme service to surgeons, enabling them to avoid and overcome difficulties with which they have heretofore had to contend in operations upon the intestines. While reference will be made to the important points presented in connection with the different conditions considered, regret must be expressed that the scope of this paper does not permit of a full transcription of the synopsis given by him.

STOMACH.

As is well known, a number of well-defined operations upon the stomach have been devised and performed with success for the relief of various conditions.

Gastrostomy.—The familiar case of Alexis St. Martin, years ago, demonstrated the feasibility of the formation of a permanent gastric fistula. Of this fact surgeons have taken advantage, and the operation of gastrostomy, undertaken for the purpose of making a permanent opening into the stomach, has been performed in a number of cases. In most of the cases it has been performed on account of œsophageal stenosis of carcinomatous character, and

hence the mortality, owing to the progress of the disease in which temporary relief was afforded, appears to be large. In itself the operation is easy of execution, and where properly performed, should be attended with a minimum of danger.

Zezas²² reports the results in 162 gastrostomies. Of these, 129 were performed for carcinoma of the œsophagus with 111 deaths and 18 recoveries (86 per cent.); 31 for syphilitic stenosis with 20 deaths and 11 recoveries (64 per cent.); 2 for cicatricial stenosis with two recoveries. In the operation for carcinoma, 17 died in the first 24 hours; 69 in one to 30 days; 19 in one to 12 months; 1 in 18 months. Gastrostomy is indicated, according to Zezas, in the following cases: first, congenital absence of the œsophagus; second, cicatricial stenosis; third, cancer of the œsophagus, or of neighboring organs causing obstruction; fourth, foreign bodies firmly lodged in the œsophagus. He further calls attention to the method of operation and the precautions to be taken for alimentation after the establishment of the fistula.

Maydl²³ reports 40 gastrostomies in five years in Albert's Clinic, in Vienna, of which 30 were for carcinoma of the œsophagus and 10 for other stenoses, with 19 deaths and 21 recoveries,—mortality 57 per cent. Death followed sooner or later in the carcinomatous cases. Permanent recovery occurred in three cases of stenosis from other causes. In these cases the stricture was dilated by passing bougies from the mouth and emerging in the wound. Gastrostomy is considered by Maydl as a much more valuable operation for stricture of the œsophagus than œsophagotomy.

Dr. N. P. Dandridge²⁴ reported to the Cincinnati Medical Society a case of cicatricial stenosis in a child four years of age, due to the ingestion of caustic potash, in which he had performed gastrostomy with success. The method of operation employed in this case was as follows: The incision was made on the left side parallel to the free border of the ribs and about three quarters of an inch below. The stomach was drawn through the opening and transfixed by two hairlip pins placed parallel three quarters of an inch apart and including one inch of the viscus. The abdominal peritoneum and integument were sutured with silk and a circle of wire sutures was passed through the integument and walls of the stomach, including peritoneal, muscular and sub-mucous coats. A final set of silk sutures held the gastric peritoneum to the edges of

the incision. For nearly 24 hours nourishment was injected through a fine needle. Forty-five hours after the operation, a small incision in the stomach was made, a piece of a Nélaton catheter introduced, held in position by transfixion with a pin and permitted to remain in for one week. At the end of this period it was removed and re-introduced on the administration of nourishment. The pins supporting the stomach and a number of the sutures were removed on the sixth day and the remainder on the eighth. Complete cicatrization took place and the child was soon able to retain half a pint of nourishment. The child at the date of the report was unable to swallow, but chewed different articles of food so as to enjoy the taste.

Gastrotomy.—The ingestion of indigestible bodies is an accident of frequent occurrence, and when the bodies are of such size or shape as to prevent their escape from the stomach, the operation of gastrotomy is required to effect their removal. The operation is by no means of recent origin, the first recorded, according to Prof. S. D. Gross²⁵ being that by Florian Mathis, of Brandenburg, in 1602, who, in this manner, removed a knife nine inches in length from the stomach of a man thirty-six years of age, who made a successful and perfect recovery. The same author records a case in which Dr. Bell, of Davenport, Iowa, performed gastrotomy and effected the removal of a bar of lead ten and one eighth inches long, one half an inch in diameter, and nine and a half ounces in weight, from the stomach of a man who had allowed it to slip into that organ while performing tricks of legerdemain.

In this case, the line of incision was made some distance from the linea alba, but parallel to it and extending from the umbilicus to the false ribs. The incision in the stomach was small, just large enough to permit withdrawal of the bar, and was not sutured, closing by muscular contraction. The patient made a prompt recovery.

Dr. Augustus C. Bernays²⁶ reports a case in which he performed gastrotomy one hour after the ingestion of a knife, nine and a half inches in length. The abdominal incision was made in the linea alba, five inches in length, and that portion of the stomach in which the handle was felt (the pyloric) was brought through the wound and grasped by two army bullet forceps placed on either side of the handle. An incision five eighths of an inch in

the walls of the stomach permitted the easy extraction of the knife, without the escape of any of the contents of the stomach. The method of suture employed in closing the gastric incision, Dr. Bernays states, was very similar to one used by Billroth and Czerny in their operations of resection of the pylorus. Very thin catgut was used for the first five interrupted sutures carried through the peritoneal, muscular and part of the submucous coats, which were cut very close. Eight Lembert sutures made with very thin Chinese silk, were applied over the catgut sutures and completely buried them. The abdominal sutures were removed on the fifth day, and on the fourteenth day the patient was discharged from treatment. Appended to the paper is a table containing the record of thirteen cases, the last being that of Dr. Bernays, in which gastrotomy was performed for the removal of foreign bodies where there existed no adhesions between the stomach and abdominal walls. In these cases, the bodies had remained in the stomach from a period of one hour to several years. The author further states that only 13 cases in which operations had been performed, have been recorded in 251 years. The mortality, as computed from this table, is only 10 per cent. The distinctive features of this case are the very short time which elapsed from the ingestion, to the removal, of the knife, one hour, and the length of the foreign body, nine and a half inches. (Examination of the report of Dr. Bell in the *American Jour. of Med. Sciences* shows that the length of the bar of lead was ten and one eighth inches). The abdominal incision in the linea alba is preferred by the author as affording more room for operative manipulation than the oblique incision parallel with the ribs. The table shows that the method of applying the sutures in closing the gastric incision varied greatly. In two instances no sutures were employed, the patients recovering, and in others, interrupted and Lembert sutures were used alone or conjoined. The use of the continued suture is strongly condemned, as it is opposed to securing union by not keeping the parts accurately approximated by an evenly distributed pressure.

Prof. Loretta,²⁷ of Bologna, performed this operation for the removal of a large number of needles from the stomach of a young woman who had swallowed them with suicidal intent and who was suffering severe pain. Exploration of the stomach failed to find many. On further search several were found protruding above

the surface of the margin of the left lobe of the liver. Some of these were successfully removed, while others were broken off in the attempt. The gastric and abdominal incisions were accurately closed and the patient made a good recovery.

M. Polaillon²⁸ reported to the French Academy of Medicine a case in which he removed a steel fork by gastrotomy from the stomach of a juggler. Exploration of the abdominal walls and the introduction of the œsophageal bougie gave no evidence of the foreign body in the stomach. A magnetic needle suspended by a cord was immediately deflected on being brought in contact with the abdominal walls in the epigastric region, thus establishing the diagnosis. The patient was well on the 16th day after the accident.

Gastrectomy.—In its general application this term has been applied to excisions of the stomach involving removal of a larger or smaller portion. Later, the term *pylorectomy* has been employed to describe operations when limited to exsection of the pyloric extremity of the organ which is most frequently the seat of morbid conditions demanding surgical interference. In the limited sense, gastrectomy may be applied to the excision of growths occupying the walls of the stomach or to the excision of localized lesions—as ulcers of the stomach—in which it has been most frequently employed outside of the pyloric region. According to Senn²⁹ a case of perforating ulcer of the stomach has been successfully treated by Czerny by excision. The operation is regarded by Rydygier as a justifiable procedure in arresting hæmorrhage from a perforating ulcer of the stomach. No cases of this character, so far as has been observed, have been reported during the past year.

Pylorectomy.—In view of the high rate of mortality which has attended the operation, owing chiefly to its performance in malignant diseases of the pylorus, earnest discussion has taken place in the current medical literature of the past year with regard to the cases in which it should be employed. Mr. McArdle³⁰ read a paper before the Surgical Section of the Academy of Medicine in Ireland on resection of the pylorus, detailing a case in which he had operated with an unfavorable result, the patient dying from exhaustion four hours after the operation. He presented some interesting facts in relation to the occurrence of carcinoma of the stomach, and, as evidence of the importance of operative inter-

ference, he stated that of 1342 cases, the disease was confined to the pylorus in 802, and of this number 496 were suitable for operation, owing to the absence of glandular involvement and of adhesions to adjoining viscera. In 70 cases, 62 were for carcinoma, with 35 deaths; 8 for simple cicatricial stenosis with three deaths. Extensive adhesions complicated the operations for carcinoma. In 289 cases which he had tabulated, adhesions to the pancreas existed in 132, to the omentum in 80, to the transverse colon in 72, to the liver in 4, and to the small intestine in 1. He considered the operation justifiable in cases of irritable and intractable pyloric ulcer provoking spasmodic stricture, in simple fibrous stricture and in circumscribed carcinoma without adhesions to pancreas or transverse colon.

Wölfler³¹ reports a case in which he had resected the pylorus for carcinoma, the patient living five years after in very comfortable condition and quite free from disturbances of the stomach,—death supervening upon exhaustion consequent upon a disseminated return of the disease. The result of the operation had been most complete, revealing a constriction with folds of mucous membrane at the site of the former pylorus. The site of the suture could not be detected externally. Microscopic examination showed the absence of peptic glands, and a new sphincter formed by a compensatory hypertrophy of muscle and connective tissue.

Rydygier,³² at the meeting of the 16th Congress of German Surgeons, reported extremely gratifying results in three cases of resection of the pylorus. In one of the cases in which the operation had been performed for carcinoma, the patient had lived for two years and a half. In the second the patient, a woman who was stated to be suffering from carcinoma, was living at the expiration of six years, in good health, and had given birth to two children. In one resection for ulcer, the patient was well at the end of three years.

Von Hacker³³ reported 15 cases of resection of the pylorus for carcinoma, with 7 recoveries, and 3 cases of cicatricial stenosis, with one cure. In an elaborate editorial article Dr. S. W. Gross³⁴ discusses the results obtained by the operations of pylorotomy since its first performance by Péan in April, 1879. His conclusions are deduced from the study of the results in over 100 operations performed during the past 6 years. In this article the

discussion of results is limited to those obtained in carcinoma and cicatricial stenosis, in which it is stated that the mortality is about 75 per cent. in the former and 50 per cent. in the latter. In Billroth's clinic, von Hacker states the mortality to be 55 per cent. With regard to final results, Dr. Gross believes that there is probably no case of pyloric carcinoma in which a permanent cure has been effected, five years and three months being the longest period of life after the operation. In many of the cases surviving for a longer or shorter period, great relief from distressing gastric disturbances has been experienced. For cicatricial stenosis of non-malignant character, Dr. Gross considers pylorotomy as a severe and dangerous method, and suggests as preferable the method of digital divulsion, as practiced so successfully by Loretta, or incision with transverse suturing, as practiced by Heineke and Mikulicz. He refers to the experience of Kocher, who has reported the recurrence of a stenosis after pylorotomy and thinks it may be due to his method of crushing the edges of incision with forceps previous to the introduction of sutures uniting the stomach and abdomen.

Digital Divulsion in Stenosis of the Pylorus.—Allusion has been made above to the method practiced by Loretta, of Bologna, of effecting dilatation in cases of contraction of the pylorus by gastrotomy and forcible digital divulsion. In non-malignant stenosis this method has been followed by results more or less permanent in character, while in those of malignant character, the amelioration has been such as to justify the operation.

Removal of Pyloric Obstruction due to Carcinoma by Free Curetting.—Dr. Bernays³⁵ describes an operation for the removal of carcinomatous growths involving the pylorus which he has practiced with marked relief of distressing symptoms and with the effect of prolonging life. Gastrotomy is performed, an incision being made in the walls of the stomach through which curettes are introduced and the masses scraped away. Hæmorrhage is arrested by washing out the stomach with iced carbolized water, which causes contraction. He reports two cases, in one of which the operation was repeated at the end of three and a half months with great relief to the patient. The second patient was equally benefited by the operation. The value of this method will be found in its application to those cases in which extensive adhesions and involvement of surrounding structures forbid a resort to pylorotomy.

Gastro-Enterostomy.—Careful study of the results obtained in carcinoma of the pylorus after the operation of pylorectomy, show conclusively that while, in exceptional instances, the results have been most satisfactory as to relief from suffering and prolongation of life, the operation, in itself one of great gravity, is only a palliative measure. Frequently, it has been impossible to perform the operation owing to extensive adhesions and infiltration into surrounding structures. In view of these difficulties and conditions, Wölfler devised the formation of a fistulous opening between the stomach and duodenum or upper part of the jejunum, by means of which the continuity of the alimentary canal is re-established. Recently this operation has come into prominence as a proper substitute, in many cases, for pylorectomy, especially in cases of cicatricial stenosis, where its beneficial results may be regarded as permanent. The operations of duodenostomy and jejunostomy, the former devised by Langenbuch, the latter by Pearce Gould, to substitute pylorectomy in inoperable pyloric stenosis, have been practically abandoned and have given place to gastro-enterostomy which presents far superior advantages. Dr. Rockwitz,³⁶ of Strasburg, presents, in an elaborate paper, a *résumé* of the subject and gives in detail the results obtained in the Strasburg Clinic. In an able editorial review of this article Dr. S. W. Gross³⁷ sums up the results of this operation to date. At that time it had been performed 29 times with 16 recoveries and 13 deaths,—a mortality of 45 per cent. A phenomenal success attended the operation of Prof. Luecke of Strasburg, who performed 8 operations with 7 recoveries and 1 death. As the operation of gastro-enterostomy has, in almost every case of pyloric carcinoma, been undertaken in cases which precluded resection, or in which the effort had been made and was abandoned, the mortality must be great and the period of survival materially shortened. In many of the cases of recovery a notable gain in flesh was observed and the duration of life succeeding the operation was from 1 to 14 months. In one case of supposed carcinoma reported by Hahn,³⁸ the patient was living at the expiration of two years and had gained 54 pounds. The immediate causes of death after the operation were internal hæmorrhage, collapse and exhaustion, and later, in some cases, peritonitis.

In performing the operation, Prof. Luecke has not adhered to the injunctions of Wölfler to select the upper part of the jejunum

for attachment to the stomach, but has taken the most convenient fold and completes the operation as rapidly as possible. He does not approve of the proposition of von Hacker to carry the jejunum beneath the inferior layer of the transverse meso-colon and unite it to the posterior surface of the stomach, in order to avoid compression by the transverse colon. The point selected for the opening in the stomach is stated to be midway between the greater and lesser curvatures and one-third of the distance from the pylorus to the cardia. It is important that the point should be free from blood-vessels. A line of interrupted silk sutures carried through the peritoneal and muscular walls an inch in length, is employed to fasten the intestine to the stomach. Immediately above this the stomach and intestines are incised and the mucous membrane sutured. A second line of sutures is now made to further secure the junction, the organs are returned to the abdominal cavity and the wound closed. The article of Dr. Rockwitz is concluded by several important suggestions with regard to the method of operation, as quoted in the review above cited:—

1. All separation of adhesions, isolation and manipulation in the abdominal cavity ought to be carefully avoided.

2. Previous preparation of the patient, such as careful washing out of the stomach by a tube introduced through the mouth, is of importance for the success of the operation.

3. The incision in the linea alba is to be preferred.

4. Use the first convenient coil of intestine for the formation of the gastro-intestinal fistula, and avoid much searching and manipulation in the attempt to reach the plica duodeno-jejunalis.

5. The danger of compression of the colon by the mesentery of the raised small intestine is not sufficiently great to demand a complicated and dangerous modification in order to avoid it.

6. In the formation of the fistula, employ the original simple method, as the formation of spurs and bends is not avoided by the more complicated procedures.

7. In order to secure a good functional action, the peristalsis of the bowel must correspond to that of the stomach.

8. For the formation of the fistula, less depends upon the method of suture than upon its exact and proper execution.

At a meeting of the Imperial Society of Physicians at Vienna, Dr. Teleky³⁹ introduced an interesting point for discussion with

regard to an important diagnostic symptom in carcinoma of the stomach,—the absence of free hydrochloric acid in the gastric juice. It was stated that an examination for this agent was usually made at Billroth's clinic.

Prof. von Bamberger remarked that the opinion that the free acid was not present was not correct. Vander Velden had shown that it was always present. It was further stated, however, that the two usual reactions with methylanilin and tropæolin were not to be obtained in carcinoma ventriculi. Prof. von Bamberger stated that in case of *ulcus ventriculi* he had observed the same failure to obtain these reactions.

Thiriar¹⁰ states that if the urea in the urine sinks below 12 grammes in the 24 hours, this fact indicates, in case of an abdominal tumor, its malignant nature. The same test may distinguish the existence of a malignant tumor of the pylorus.

Shot and Stab Wounds of the Stomach and Intestines.—As gunshot wounds of the stomach are very rarely isolated, nearly always being associated with similar lesions of the intestines, their consideration may be included with those involving likewise the intestines. On the other hand stab wounds may be limited to the stomach. The statistics of the War of the Rebellion, compiled by Otis, show that in 1072 gunshot wounds of the abdomen the stomach was wounded 79 times, the intestines 653 times, and there were 732 wounds of the alimentary canal against 340 of other abdominal viscera. The extent and anatomical relations of the digestive tube explain the occurrence of frequent injury when the abdominal cavity is traversed by a missile.

With regard to the treatment of penetrating gunshot wounds of the abdomen, sufficient knowledge has been gained up to this time from experimental research and from experience in the successful management of cases of operation to define, in positive manner, the surgical procedures to be adopted. It having been decided that interference is demanded in every case of wound of the digestive canal, the important question arises how shall the condition be determined? Outside of the considerations of shock, hæmatemesis, melaena, etc., careful exploration of the wound of the abdominal wall should be made with the finger or probe, and if the penetration has occurred, median section, in case of gunshot injuries, should be made in order that accurate examination may

be accomplished. In stab wounds, owing to their localized nature, enlargement of the wound is usually sufficient to reach the organ involved. The necessity for prompt interference, as soon as the fact of penetration has been ascertained, has been made more manifest in a number of cases reported in which no symptoms of visceral injury were present. If, in these cases, delay had occurred until the appearance of later symptoms, the benefit to be derived from operative interference would have been materially lessened if not entirely removed. The question of the contra-indications which may forbid a resort to laparotomy has been discussed and the conclusions arrived at indicate that profound shock is the only decided contra-indication. The experience of operators has shown that shock is not usually a prominent symptom in intestinal wounds, and hence where this is present, the inference may be made that some of the solid viscera are implicated. Even in these cases laparotomy may be of great service in enabling the surgeon to control dangerous hæmorrhage or prevent the extravasation of secretions liable to provoke promptly grave conditions. Prompt completion of the operation required is of importance as the prolonged manipulation and exposure of the viscera is fraught with danger. Increasing experience demonstrates that for all wounds of the stomach and intestines suture is best effected by the Lembert method, a small round needle and fine silk being employed to secure application. Excision of the lacerated edges in shot wounds is not deemed necessary, care being taken to introduce the sutures sufficiently beyond the edge; in wounds of the mesentery, however, excision of the edge is advised. Where a number of wounds exist in close approximation it may be desirable to resect the wounded portion rather than close the numerous openings by sutures.

The current medical literature of the past year has received many valuable contributions in papers read before societies and individual articles in journals, increasing largely the sum of knowledge upon this important branch of abdominal surgery. Among the more elaborate papers, the value of which has been enhanced by the addition of tables of recorded cases to date, is that of Dr. T. S. K. Morton,⁴¹ read before the meeting of the Philadelphia County Medical Society, Jan. 26, 1887. Dr. Morton tabulated 22 recorded cases of gunshot wounds in which 5 recov-

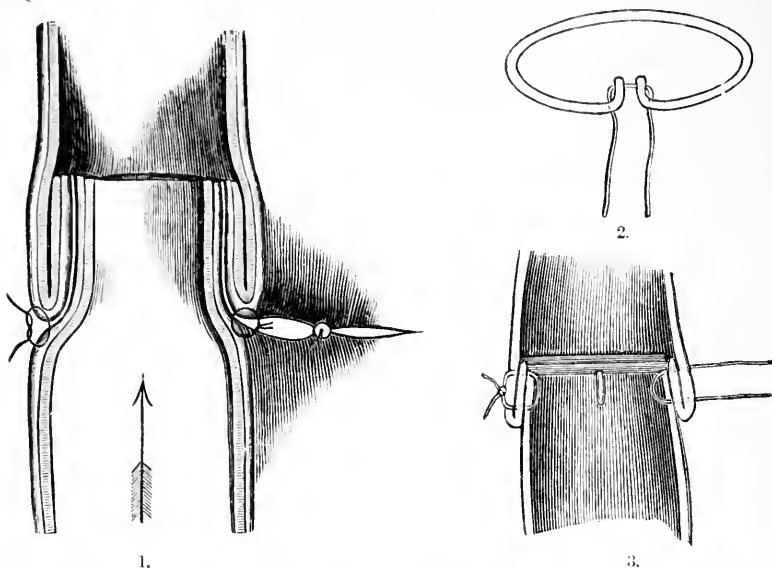
ered and 17 died,—a mortality of 77 per cent. Of stab wounds 19 are reported, of which 12 recovered and 7 died,—a mortality of 36 per cent. Sir Wm. MacCormac,⁴² in an oration delivered before the Medical Society of London, May 2, 1887, records 30 cases of shot wounds, of which 22 died, 17 were successful and 1 doubtful; of stab wounds, 18 cases with 10 recoveries and 8 deaths. Dr. Carson,⁴³ in a paper read in the section of surgery, American Medical Association, June, 1887, reports he has collected from all sources 44 cases of gunshot wounds for the relief of which laparotomy was done, with 13 recoveries, 30 deaths and 1 doubtful. Dr. Packard⁴⁴ reported to the Philadelphia Academy of Surgery, March 7, 1887, a case of interest, in which laparotomy was performed and 11 shot wounds were found in the intestines and sutured. Death occurred from exhaustion 14 hours after the operation, and the autopsy showed that the intestinal wounds had been completely closed. Dr. W. W. Keen⁴⁵ read at the meeting of the American Surgical Association, May 12, 1887, a paper, giving an account of a pistol shot wound of the abdomen involving the liver, stomach, superior mesenteric artery and vein, small intestine and kidney, in which laparotomy was performed, death occurring on the 12th day from peritonitis. At the autopsy, gangrene with perforation of the intestine was found opposite a wound close to the mesenteric border, which had been accurately closed; local gangrene was also found in the mesentery. This gangrene was thought to be due to a contusion of the mesentery involving an arterial branch, and attention is called to the necessity of careful examination for such conditions in intestinal wounds. Nephrectomy was performed on account of the wound of the kidney,—a procedure which is deemed advisable in such cases owing to the difficulty of controlling hæmorrhage or preventing the escape of urine. Dr. Fox⁴⁶ reports a case of pistol shot wound of the abdomen involving the omentum, transverse colon, jejunum and mesentery of the jejunum, in which laparotomy was performed, the wounds of intestine and mesentery closed with fine silk Lembert sutures, the patient making a good recovery. In this case, as has been noticed in others, invagination of the intestine, of recent origin, was observed to have taken place, due, it was thought, to the increased peristalsis produced by the wounding of the intestines.

In the present state of our knowledge, the following conclusions may be stated, with regard to the treatment to be adopted in traumatisms of the abdominal cavity, relating especially to shot and stab wounds of the intestinal canal:—

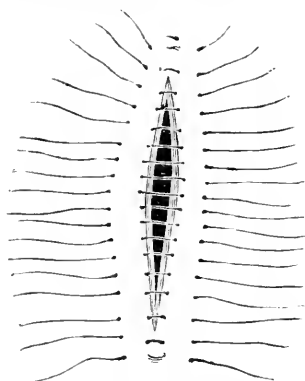
1. Penetration of the abdominal cavity should be determined by careful exploration of the wound with the finger or probe, first thoroughly disinfected. 2. If penetration is found to exist, laparotomy should be performed by median section, the alimentary canal should be critically examined in its entire extent, including the mesentery, with other viscera, when possible by sight and touch. 3. Wounds of the hollow viscera should be closed by the Lembert suture, a small round needle and fine silk being used for that purpose. Severe contusions of intestine or mesentery should be excised and sutured in order to prevent the possible occurrence of gangrene. Hæmorrhage from vessels which can be isolated, should be controlled by ligature, and from parenchymatous tissues, by pressure, by ligature or, in extreme cases, by the Paquelin cautery. In laceration of removable organs or of their important blood-vessels or ducts, as the spleen, or kidney, the viscus should be excised. 4. Experience has shown that those cases in which surgical interference has been promptly instituted, have been attended by the most favorable results; hence in all cases surgical aid should be at once summoned: waiting for symptoms is a dangerous practice. 5. All operations should be performed under strict antiseptic precautions; careful cleansing and irrigation of the abdominal cavity, especially if extravasations have occurred, is of especial importance, hot water and mild antiseptic solutions being used for that purpose; when needed, drainage should be instituted as in other intra-peritoneal operations. 6. The favorable percentage of success, 30 per cent., will undoubtedly be increased with increasing experience and skill of operators.

Resection of the Intestine—Enterectomy.—Dr. Newell⁴⁷ read before the surgical section of the Suffolk District Medical Society an able paper on intestinal suture, in which was given the history of the suture, and its various modifications to the present time. Quoting the statement of Rydygier that the first recorded resection with union of the completely divided intestine, was the operation of Duverger in 1837, the author refers to the invagination method of Jobert (see fig.) and to the view promulgated in 1826 by Lembert of

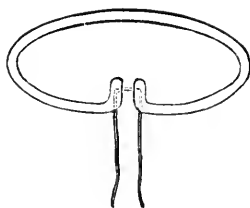
the great importance of bringing into apposition the serous coats, including the sero-muscular layer, in order to obtain union (see



- 1.—JOBERT'S METHOD OF SUTURE AS MODIFIED BY MADELUNG.—In place of passing the sutures, as advised by Jobert, through the whole thickness of the invaginated intestine, which would include three layers of gut, Madelung sutures the serous layers together around the line at which the invagination begins. The invaginated portion will thus be directed valve-like whichever way the intestinal current passes, and the danger consequent upon mistaking the upper for the lower end of the bowel is avoided.
- 2.—JOBERT'S SUTURE.—In this method the mucous membrane is included in the loop.
- 3.—DIAGRAM OF THE RELATIONS OF THE INTESTINAL COATS AND SUTURES. (Jobert.)
—(*Boston Med. and Surg. Jour.*)



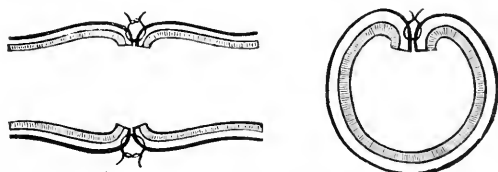
MANNER OF PASSING THE SUTURES.
(Lembert's method.)—(*Boston Med. and Surg. Jour.*)



LEMBERT'S SUTURE, IN WHICH THE MUCOUS
MEMBRANE IS EXCLUDED.—(*Boston Med. and Surg. Jour.*)

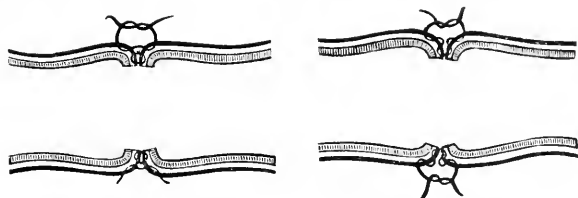
fig.)—a fact upon which all other methods have been founded and upon which their success has depended. Description in detail is

given of the method of Reybord, Dedan, Béranger, Férand, Amussat, Gély and others, which are not now employed. The first important modification of the Lembert suture was that of Czerny, which united the edges of the wound as well as the serous coats, a double row of sutures being required for this purpose. (See fig.) Gussen-



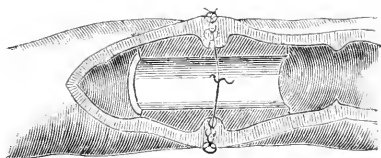
CZERNY'S SUTURE.—(*Boston Med. and Surg. Jour.*)

bauer proposed to accomplish the Czerny-Lembert method by a figure of 8 suture, and Kürschner employed a continuous suture, instead of the interrupted one of Lembert. (See fig.) Bishop's suture is so arranged that the knots are placed on the inside and the sutures ulcerate into the bowels and discharge. The methods



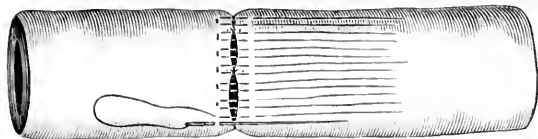
GUSSENBAUER'S SUTURE.—(*Boston Med. and Surg. Jour.*)

of Neuber and Madelung are regarded as of especial value in uniting the resected ends of the intestine. In the former a piece of decalcified bone tube, 2 c.m. in diameter, and bulging in the centre, with a deep groove in the middle, is employed. (See fig.) The ease with which the sutures are taken over a firm substance, protection of the wound from contact with the intestinal contents and the free passage afforded for the contents of the intestines, are the advantages claimed for this method. The decalcified bone tubes disappear in the intestines. The method of Madelung consists in the use of disks made from the costal cartilage of a young calf, thin, and from four to six millimetres in circumference. The ends of the bowels are united by the Kürschner suture and the disk placed, one on either side of the wound, by the Lembert



DECALCIFIED BONE TUBE.—(*Boston Med. and Surg. Jour.*)

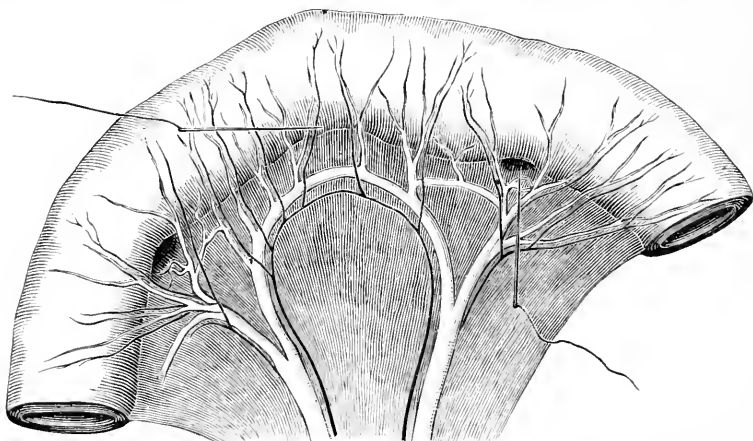
suture. The great desideratum in the use of the intestinal suture is to obtain the most complete and secure apposition of the serous surfaces, with the least reduction in the calibre of the intestine. The objection to the suture which traverses all the intestinal coats is that escape of the intestinal contents may occur through the punctures. The continuous suture is unsafe, owing to the fact



PRESECTION, BURIED-KNOT STITCHES TIED; PLAIN-QUILT, POST-SECTION STITCHES INTRODUCED.—(*Am. Jour. Med. Sciences.*)

that the detachment of one portion involves the whole suture and destroys its effect in maintaining apposition.

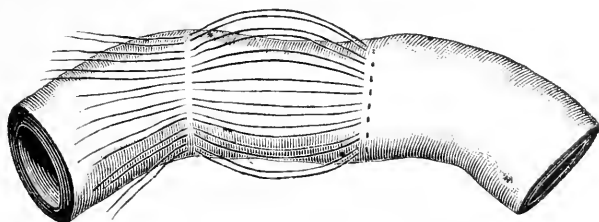
Dr. Wm. S. Halsted⁴⁸ reports the results of an experimental study of circular suture of the intestine. The author employed, in his experiments, a form of suture described as the plain quilt, which he found effective in maintaining apposition of the resected



INTRODUCTION OF NEEDLE INTO CONCAVITY, FREE FROM FAT, IN TAKING THE FIRST PRESECTION STITCHES.—(*Am. Jour. Med. Sciences.*)

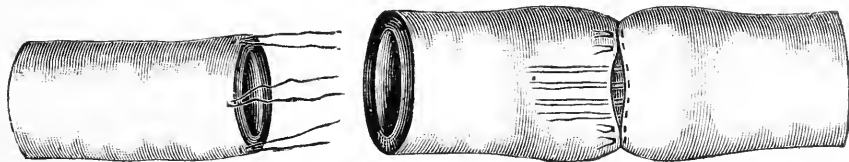
ends of the intestines, the application of which is seen in the accompanying drawings. He calls attention to the fact that operators have neglected to appreciate the value of the submucous coat in the use of intestinal sutures, and substantiates his statements by quotations from recent writers. As the result of his experimental work he concludes that it is impossible to suture the serosa alone, or the serosa and muscularis alone, and the sutures which include

nothing but these two coats tear out easily and are not to be trusted. Each suture should include a portion of the sub-mucosa.



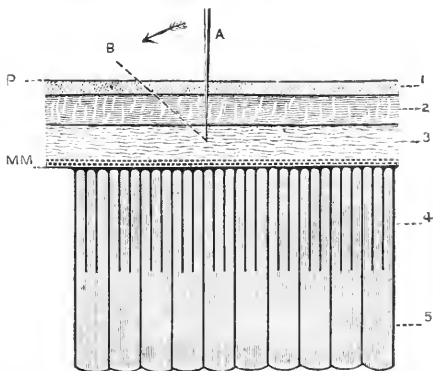
PLAIN-QUILT, PRESECTION STITCHES INTRODUCED.—(*Am. Jour. Med. Sciences.*)

It is not necessary to excise a triangular piece of the mesentery, and it is unadvisable to suture the edges of the rent in the mesentery owing to the possible inclusion of small blood-vessels



INTESTINE DIVIDED CLOSE TO PRESECTION, BURIED-KNOT HALF STITCHES. INTES-
TINE AFTER ALL BUT FOUR OF THE PLAIN-
QUILT STITCHES HAVE BEEN TIED.
—(*Am. Jour. Med. Sciences.*)

which contribute to the blood supply of the sutured parts. Senn, in the synopsis of his paper cited above, states that resection of more than six feet of the small intestine in dogs is uniformly fatal, owing to the immediate effects of the trauma. Resection of more than four feet of the small intestine in dogs is incompatible with normal digestion, absorption and nutrition and often results in death from marasmus. Physiological exclusion of an extensive portion of the intestinal tract does not impair digestion, absorption and nutrition as seriously as the removal of a similar portion by resection. The excluded portion of the bowel undergoes progressive atrophy. Intestinal anastomosis or the formation of a fistulous communication between the bowel above and below the seat of obstruc-



P. PERITONEUM. 1. LONGITUDINAL MUSCULAR COAT. 2. CIRCULAR MUSCULAR COAT. 3. SUBMUCOSA. MM. MUSCULARIS MUCOSÆ. 4. GLANDS OF LIEBERKUHNS. 5. VILLI.—
(*Am. Jour. Med. Sciences.*)

tion should take the place of resection and circular enterorrhaphy in all cases where it is impossible or impracticable to remove the cause of obstruction, or where the pathological conditions which have given rise to the obstruction do not constitute an intrinsic source of danger. In the well known case of Koeberle, 6 and 1-2 feet of the intestine was resected, the patient survived and did not experience any ill effects from the mutilation. In a case under the care of Kocher,⁴⁹ of Bern, 3 feet and 6 inches of the small intestine were removed for strangulation with a successful result. Resection of the intestine is demanded for the following conditions: 1, artificial anus, or faecal fistula; 2, stenosis; 3, gangrene; 4, malignant tumors.

Artificial Anus.—In the place of the old operation in which the lumen of the intestine was restored by division of the spur by means of Dupuytren's enterotome, detachment from the fistulous opening and resection is now advised and practiced. Kocher's case, cited above, shows that resection and removal of a large section of the intestine is a safe procedure and is preferable, in cases of gangrene, to the formation of an artificial anus and subsequent resection in 24 hours, as advised by Riedel, or in three or four weeks as practiced by Juillard. In performing resection, Kocher avoids the removal of a wedge-shaped piece of the mesentery, believing that by this method the blood supply to adjacent portions of the intestines may be interfered with. He divides the mesentery squarely, ties blood-vessels and does not suture the wound in it. He unites the resected ends by two lines of sutures, the first interrupted and the second continuous.

Stenosis.—In cases of stenosis, due to malignant disease, resection is necessary, where it is practicable by reason of the absence of extensive adhesions or involvement of surrounding structures. When these conditions exist, intestinal anastomosis should be practiced as advised by Prof. Senn. In cicatricial stenosis digital divulsion may be employed as in pyloric stricture. A case is reported in which Dr. Barton⁵⁰ performed laparotomy for intestinal obstruction and finding marked stenosis at the ileo-cæcal junction incised the intestine, and dilated the contracted bowel to its normal size with instruments and with the finger.

Gangrene.—Numerous reports of cases in which resection has been performed for gangrene occurring in connection with

acute intestinal obstruction have appeared in the current medical literature of the past year. Associated, as the lesion is, with different conditions, the discussion of proper methods of operative treatment to be adopted naturally accompanies the consideration of those conditions. The question of immediate resection and reposition of the intestine has been referred to above and the views of Kocher given upon it. Upon this subject opinions vary, as will be seen, and increasing experience is needed to arrive at its solution.

Malignant Growths.—Resection of the intestine may be performed in cases of malignant growths in which the disease is sufficiently isolated to permit of its easy removal. When infiltration into the surrounding structures is present, intestinal anastomosis, as advised by Senn, should be practiced instead of resection. When the cæcum or colon is involved, “the communication above and below the seat can be established by apposition with decalcified perforated bone plates or by lateral implantation of the ileum into the colon or rectum, forming an ileo-colostomy or ileo-rectostomy. Intestinal anastomosis or lateral implantation should be resorted to in all cases where circular enterorrhaphy is impossible on account of difference in the size of the lumen of the two ends of the bowel.”

Intestinal Obstruction—Acute.—The experimental researches of Senn have thrown much light upon the causes concerned in the production of certain forms of acute intestinal obstruction and the occurrence of gangrene in these cases. His experiments have shown that in invagination, the accumulation of intestinal contents above is one of the most important factors which prevents spontaneous disinvagination, and which determines gangrene of the intussusceptions. Constriction at the neck of the intussusceptions, interfering with the venous circulation, is the immediate cause of gangrene. With regard to ileo-cæcal invagination, he states that this lesion, when recent, can frequently be reduced by distension of the rectum and colon with water. This method, however, must be practiced with great care, as over distension may produce multiple longitudinal lacerations of the peritoneal coat of the intestine, leading to very grave consequences. As the incompetency of the ileo-cæcal valve can only be overcome by over-distension of the cæcum, which causes a separation of the margins of the valve, it is

imprudent to attempt treatment of intestinal obstruction beyond this valve by injections per rectum.

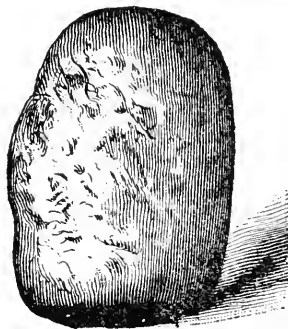
The question of operative interference in the different forms of acute intestinal obstructions due to impaction of foreign bodies, invagination or intussusception, volvulus, intestinal strangulation by bands or through apertures has been very freely discussed. Dr. Allen⁵¹ read a paper before the East Sussex Medical Society on intestinal obstruction from impaction of a gall stone in the ileum, citing a case which came under his care. He discusses the history and the symptoms presented in the case which led to his diagnosis of impacted gall stone. The points which guided him were gradual invasion of the symptoms, total absence of abdominal distension, which excluded involvement of the large intestine, including volvulus; slow invasion, excluded internal strangulation or volvulus in small intestine; total absence of collapse; vomiting not severe and not stercoraceous until the 14th day; pain not acute; absence of blood or mucus in the evacuations removed by enemata. The completeness of the obstruction and the absence of a tumor excluded acute intussusception. Absence of peritonitis. These symptoms pointed to impaction by a foreign body and the history of hepatic colic was evidence that the body was a gall stone. Aperients and enemata having failed to dislodge the body, laparotomy was performed by Mr. Beck and an impacted gall stone, measuring three and one half inches in circumference and one and three quarters in length and weighing one ounce, was found in the lower part of the ileum and excised, the intestinal wound being closed by Lembert sutures. Death occurred 25 hours after the operation, apparently from peritonitis, as no autopsy was made to determine it definitely. The author refers to 39 cases recorded in the *Index-Catalogue of the Library of the Surgeon-General U. S. A.* In these cases no operation was performed; some of the stones were passed with the stool, others caused death and were discovered post-mortem.

Mr. Thos. Smith¹⁰⁵ in consultation with Dr. Anderson removed a large impacted gall stone from small intestine with a successful result.—(See fig., p. 101.)

Mr. Lawson Tait reports a case of impacted gall stone in which, instead of performing enterotomy, he introduced a strong needle and broke up the stone into a number of fragments, thus

enabling them to pass easily through the intestine with the stool.

The report of a successful operation in a case of acute intestinal obstruction is made by G. E. Williamson.⁵² On opening the abdominal cavity by an incision over the right rectus muscle, the intestine was found constricted by inflammatory bands attaching it to the abdominal wall near the umbilicus. Some of these were brought out of the wound, tied with catgut ligatures and then divided between, and others were separated with the fingers. The patient made a good recovery. C. Stonham, F.R.C.S., reports (*Brit. Med. Jour.* 5, 21, 87) a case in which he performed laparotomy for intestinal obstruction of an obscure character. When the abdomen was opened the greatly distended transverse colon immediately protruded through the wound and acute peritonitis was found to exist, the surface of the intestine being coated with lymph. On tracing up the gut from the rectum, the sigmoid flexure and colon were found empty, but on arriving at the splenic flexure there was suddenly a large escape of flatus by the anus and the distended transverse colon collapsed at once. The patient rapidly recovered and continued well. The obstruction in this case was



ANDERSON-SMITH GALL STONE.
(*London Lancet.*)

thought, from the symptoms presented, to have been a twist at the splenic flexure of the colon. Constriction by a band of slight texture would appear to afford an explanation, especially as peritonitis was present. The latter condition was thought to be secondary.

Senn⁵³ reports a successful operation for volvulus in one of the Continental hospitals. Distension of the abdomen was present with a well defined tumor above the umbilicus. Twist, one and a half times, found in the small intestine which was easily corrected, the intestines returned and wound closed. Unfavorable symptoms promptly disappeared and the patient convalesced rapidly.

Mr. J. H. Keeling⁵⁴ discusses the question of surgical interference in acute intestinal obstruction in a paper read before the

Suffolk Medico-Chirurgical Society, March 17, 1887. He states that the most recent and careful statistics, chiefly post-mortem, show that in more than one fourth of all cases of internal obstruction of the bowels, the agent is a constricting band or aperture. This proportion comes out when all ages, both sexes and every form of obstruction, chronic as well as acute, are counted,—the only cases omitted being external hernias and disease and malformation of the rectum. Intussusception accounts for a still higher proportion, being responsible for more than one third of all such obstructions. Excluding external hernias and rectal malformation and disease, constricting bands and intussusception account for nearly one half of all intestinal obstructions, of whatever nature. Therefore, in a case of intestinal obstruction not due to external hernia or rectal trouble, the chance is one in four that the cause is a band or ring, and one in three that intussusception exists. In making a diagnosis in acute cases, such causes as stricture, cancer, faecal accumulations, morbid growths and tumors, external to the intestines, can be eliminated as they present chronic rather than acute symptoms. Assistance is further rendered by the fact that in the now much limited group of causes, there are one or two which are at once betrayed, either by a point in their etiology or by a characteristic and easily observed symptom. In intussusception, which is a frequent cause, diarrhœa not unfrequently occurs, and in 80 per cent. a discharge of blood and mucus per anum; constipation is extremely rare. In constriction by bands or through apertures, in volvulus, in obstruction by gall stones or foreign bodies, there is absolute constipation. Intussusception is essentially a condition occurring in the young, more than 50 per cent. being under 10 years of age. Volvulus and constriction by bands are very rare in children. Volvulus of the sigmoid flexure is rare under 40 years of age and both it and obstruction by gall stones or foreign bodies, are rare in comparison with constriction by bands. Gall stones and foreign bodies become impacted in the small intestines or at the ileo-cæcal valve. Symptoms of hepatic colic usually precede gall impaction. The ingestion of a foreign body large enough to obstruct the bowel is always known by the patient.

Mr. Knaggs⁵⁵ read before the Leeds and West Riding Medico-Chirurgical Society, Feb. 4, 1887, a paper on resection of an

irreducible and gangrenous intussusception, with a consideration of the two chief methods of treatment, inflation and abdominal section. In his case, a healthy boy of five and a half years, inflation was tried without success and laparotomy resorted to. An intussusception of the lower portion of the ileum through the ileo-cæcal valve was found, the bowel resected and owing to the patient's serious condition, an artificial anus was formed. Death ensued an hour and a half after the operation. Referring to the fact that very few text books allude in sufficiently strong terms to the danger attending the forcible distension of the intestine by air or water, and quoting the general opinion that if inflation does no good at least it can do no harm, Mr. Knaggs cites 8 cases, in some of which post-mortem examination showed injury to the bowel, even rupture, and in others death was supposed to be due to shock. Of these patients, 7 were very young children, 6 being less than eight months old. Attention is further directed to the question of the administration of anæsthetics during inflation, and to the proper time in the progress of the disease for its employment. While it is desirable to have the co-operation of the patient during the operation, it is also very necessary, for its successful performance, to have complete non-resistance, which is difficult to obtain in a conscious child. Anæsthetics are therefore required and their use demands the exercise of great caution in inflation lest the distension may be carried to too great an extent. Passage of portions of the gangrenous intestine being evidence that sloughing has occurred, distension by air or water should not be practiced after the appearance of this symptom. To be of service it should be employed in the very early stages and with great care. Mention is made of the fact that frequently ulceration near the point of invagination has been found associated with the lesion and may be regarded as an exciting cause, as in shot wounds of the bowel.

At the 16th Congress of German Surgeons, the subject of acute intestinal obstruction was freely discussed by Madelung, Rydygier, Credé, Mikulicz, Schede, Trendelenburg and others.⁵⁶ Madelung advocates washing out the stomach before giving anæsthetics, an operation which Küssmaul has shown will sometimes induce peristaltic action strong enough to overcome the obstruction. Incision should be made over the tumor, if such can be outlined, if not, in the linea alba. When collapse exists, an artificial anus

should be made and the operation completed at a future time. The difficulty of returning the distended intestine is great and sometimes impossible. Madelung withdraws a small coil, surrounds it with two ligatures, turns the patient on the side, incises the bowel and empties it while the ligatures are tightened. This wound is sutured, the intestine returned to the abdomen and search made with greater ease for the point of obstruction. Peritonitis is not a contra-indication, but complicates the case.

Rydygier does not approve of washing out the stomach, as the temporary improvement tends to deceive the patient, while the disease progresses. Out of 7 operations he has saved 2 patients. The incision in the linea alba is preferred, and the formation of an artificial anus should be made only in patients who are in a state of collapse. He strongly urges early operation and deprecates delay with the stomach pump.

Czerny believes that laparotomy should be performed only if the patient is in a good condition, free from abdominal distension, and when the probable seat of the obstruction can be determined under an anaesthetic. He prefers enterostomy, which is considered by Rydygier insufficient, as bands and adhesions may still exert pressure and cause inflammation despite the escape of faeces through the artificial anus.

Credé urges early operation. He has found in his observation of 30 cases of laparotomy for intestinal obstruction, that former disease was mostly responsible, existing principally in the form of old adhesions. He thinks it very important that operations should be performed when the colicky pains are most intense and reports three successful cases operated upon by him at this juncture. He calls attention to the recurrent attacks of colic in these cases, which physicians should recognize and summon surgical aid promptly, as collapse quickly follows on the occurrence of impassable obstruction.

Mikulicz thinks that laparotomy is indicated only in cases in which mechanical obstruction is established beyond doubt and then should not be performed until collapse supervenes. He deferred operation in three cases and spontaneous recovery ensued in all. In distension of the intestines he makes an opening, introduces a large tube which is packed around with iodoform gauze, and presses out the contents. As a rule, septic peritonitis is the cause

of death, and this he endeavors to prevent by thorough cleansing of the peritoneal cavity, irrigations with salicylic acid solutions, and drainage when needed.

Schede asserts that 50 per cent. of all cases recover, after stomach irrigations or by rest and opium alone. Spontaneous cure has occurred in cases under his care as late as the 35th day. Early operative interference should be restricted to those cases in which collapse occurs after a few hours. In 26 cases operated upon early he has saved but 7.

Steltzner advocates early operation; out of 8 cases he has saved 4.

The views of prominent German surgeons given above, indicate a concurrence of opinion with regard to the importance of early operation in acute intestinal obstruction. That spontaneous recovery will take place in a certain number of cases is undoubted; that it is impossible for it to occur in certain other cases is equally true. The early recognition of these latter cases is therefore of the greatest importance, in order that prompt operative interference may be instituted. The symptoms of early collapse accompanies these cases as a rule, and should guide the physician in summoning surgical aid. The occurrence of septic peritonitis in connection with obstruction, should invite laparotomy, in order that it may be treated as well as the obstruction. Increasing experience is gradually clearing away the difficulties of diagnosis in intestinal obstruction and leading to more definite knowledge and more positive treatment.

Rupture of the Intestines.—Dr. B. F. Curtis,⁵⁷ in a paper on contusion of the abdomen with rupture of the intestine, reports the results obtained in a series of 44 experiments upon dogs. Through experiments upon the cadaver, he endeavored to gain information upon the mechanics of rupture of the intestine. An analysis of 116 cases of rupture was made with especial attention to the symptoms of the early hours after the injury in the hope of establishing such points as would be of avail in making an early diagnosis possible. As the outcome of careful experimental and clinical research, an effort was made to indicate the most promising method of treatment. The experiments upon dogs showed that the most common causes after contusion of the abdomen were hæmorrhage and shock; prolonged operation, as resection of the

intestine, greatly increased the latter. Prompt action will save life in cases of internal hæmorrhage, contusion, threatened gangrene and rupture. The danger is greatly increased by delay. With regard to the mechanics of rupture, the experiments upon the cadaver demonstrated that in contusion of the abdomen the intestine is ruptured by being crushed between the contusing body and the bony parts, the vertebrae and pelvis, and that the injury is not a true rupture, but a contused and lacerated wound of the bowel. Partial distension of the intestine diminishes the danger of rupture. Great distension of an isolated loop increases the danger,—even for a loop not in contact with bony parts. In the 116 cases analyzed, the cause of the injury is given in 99; 28 were due to a kick by a horse; 13 to run over accidents; 16 to blows with heavy, and 13 with light, weights; 13 to falls upon projecting points; and 4 to crushing between buffers. In 113 cases, the seat of injury was found to be in the duodenum in 6 instances; in the jejunum 44; ileum 38; other portions of the intestine 21; and large intestine 4 times. The duodenum and colon, it will be seen, escape injury by reason of their protected positions. Complete rupture occurred in 20 cases out of the 116; in 11 cases multiple ruptures were found. In the 20 cases of complete rupture the blow was severe in all but 2; in 22 cases of partial rupture, in only 3 the blow was severe. As a rule, faecal extravasation occurs; it is reported absent in 9 cases. Laceration and contusion of the mesentery is the most frequent important complication of rupture of the intestine. Death may occur from hæmorrhage due to mesenteric laceration and gangrene from slight injury to the blood-vessels. This latter condition demands serious attention, as its importance is frequently overlooked. The symptoms are classified in accordance with the stage. Those of the first stage are shock, loss of consciousness in some cases, restlessness, vomiting; if the bladder is involved, urinary symptoms, absence of faecal passage, pain, frequently very intense, tenderness, distension of the abdomen, tension of the abdominal muscles, tympanitic resonance, dullness on percussion and loss of liver dullness. In the second stage, the symptoms are those of septic peritonitis. Subnormal temperature does not appear to have been a prominent symptom in the cases submitted to analysis,—38 in number. Constipation and faecal vomiting are common symptoms.

Three sets of cases may be distinguished. The first is characterized throughout by shock, which persists until collapse and death ensues. In the second set, frank peritonitis follows shock, the symptoms appearing rather promptly, and in the third, the symptoms of peritonitis are vague and develop by degrees, the patient gradually sinking. 48 hours after the receipt of the injury is the average duration of life as computed in 112 cases. In 8 cases laparotomy was performed and the ruptured intestine treated by suture six times, and by clamps twice. Death occurred in six of these cases soon after the operation; one patient lived 10 days and one four weeks. In making a diagnosis in cases of ruptured intestine, it is necessary to study carefully the causes and symptoms, and to differentiate the conditions present from those which accompany contusion of the abdomen with or without injury to the viscera. Peritonitis is developed in connection with some cases of simple contusion, but in the majority, after the subsidence of shock, progressive improvement is observed to take place. Hæmorrhage occurring in connection with rupture of the intestine or wound of the mesentery should be temporarily controlled by pressure upon the abdominal aorta as soon as the cavity is opened, and the bleeding points then seized with the clamps. The prolonged operation necessary to accomplish suture of the intestine render it advisable to form an artificial anus as a preliminary operation,—especially when the patient is in a state of collapse or exhaustion.

The conclusions arrived at by Dr. Curtis and the results of his inquiry are: 1. The treatment of contusion of the abdomen should be purely expectant in the early stage, until symptoms of internal injury have appeared or until the full extent of time in which they may be expected, has passed. Explorative laparotomy is inadmissible at this time. 2. Symptoms of uncontrollable internal hæmorrhage or of serious visceral injury indicate laparotomy; when the diagnosis is uncertain the operation should always be begun as an exploration. 3. Great collapse contra-indicates operative interference absolutely. 4. The formation of an artificial anus is the best treatment in rupture of the intestine; an operation to relieve this may be performed subsequently when the patient is in better condition.

Perforation of the Vermiform Appendix—Perforating Appendicitis.—A review by Geo. Thomas⁵⁸ gives the salient points

of the elaborate paper of Dr. R. H. Fitz⁵⁹ upon this subject, which, under the improved surgical methods, is assuming great importance and claiming the most serious attention of physicians and surgeons. In this paper an attempt is made to define clearly the anatomical relations of pathological conditions occurring in connection with and about the cæcum, which, heretofore, have been described under terms that fail to express accurately the origin of the lesion. Ulceration and perforation of the vermiform appendix have been found in a vast majority of cases in post-mortem examinations to have been the origin of the so-called perityphlitic abscesses, the cæcum being intact. The term appendicitis has been applied by Fitz to express the primary condition and to define its origin. A careful analysis of 257 cases of perforating appendicitis and of 209 cases of typhlitis and perityphlitis collected by him, with a comparative examination of the essential features of each, has enabled him to arrive at important conclusions with regard to the differentiation of the former from all other affections occurring in this region, and to establish certain points of importance to surgeons.

While external violence, as a fall or blow or the effort made in lifting a heavy weight, may be an exciting cause, yet the presence of a foreign body or a small mass of dried fecal matter is, in a great majority of cases, concerned in the production of appendicitis. These were found in 60 per cent. of the collected cases; this percentage, by reason of the difficulty of detection in some cases and oversight in others, may be regarded as below the real proportion. Prolonged constipation, diarrhœa and vomiting preceded the attack in many cases. Age and sex appear to have a causative relation, as 80 per cent. of the cases occurred in males and 20 per cent. in females; 76 per cent. under 30 years of age and 50 per cent. under 20 years. Congenital or acquired irregularities in the position and attachment of the appendix may favor attacks of inflammation. Inflammation of the appendix may result in its obliteration, in ulceration, in peritonitis or perforation. In the event of perforation, a circumscribed peritonitis ensues with exudation and suppuration, forming a tumor. The pus may break through the circumscribed boundaries and escape into the general peritoneal cavity and light up a general inflammation. It may open a way into the intestine, the bladder, the vagina, or

may pass to the surface of the abdomen. The occurrence of simple appendicitis, without the characteristic symptoms, is undoubtedly very frequent, as post-mortem examinations show that one in three must have, at some period of time, suffered from it. Study of the collected cases has established the fact that certain definite symptoms occur in constant sequence. Sudden severe abdominal pain, fever, prompt in appearance, usually from first to fourth day, with temperature from 100 to 102; circumscribed swelling in the right iliac fossa. Pain occurred in 84 per cent. of the 257 cases, sometimes accompanied by nausea and vomiting and located in the right iliac fossa in 48 per cent., and in abdomen generally in 36 per cent. General abdominal pain following iliac pain may be taken as evidence that general peritonitis has supervened and this, in 60 per cent. of the cases, occurred on the second, third and fourth days. Death speedily follows the occurrence of general peritonitis. In 68 per cent. of 176 cases it took place in the first eight days. The occurrence of the three important symptoms, localized pain, fever, and circumscribed swelling in well defined order, assists materially in differentiating appendicitis from other affections. The history of prolonged constipation, late appearing fever, pain of long duration and doughy character of the tumor occupying the lumbar region, indicate the existence of faecal cæcitis, with which appendicitis is liable to be confounded. Constipation, early tympanitis, retention of flatus, fever appearing late, are symptoms which characterize acute intestinal obstruction.

Appendicitis may terminate in resolution, spontaneous evacuation, or in death from shock, from general peritonitis, by exhaustion or rupture of an encysted abscess, or from exhaustion.

Fitz advises that early efforts be made to secure, if possible, termination in resolution, by the administration of opium with rest and liquid diet, cathartics and enemata being avoided. Laparotomy to be successful must be performed at the very onset of urgent symptoms and, as a rule, not later than on the third day. When the symptoms are not urgent, operation may be delayed until the formation of the tumor. The gravity of the symptoms must determine the time for interference. Before treatment by surgical means was employed, all cases which did not terminate in resolution resulted fatally. 15 per cent. died when operation was postponed until the fifth day or later. The existence of

general peritonitis does not contra-indicate operation; when collapse has supervened operation should not be performed.

Dr. Weir⁶⁰ read at a meeting of the Practitioners' Society, May 6, 1887, a paper entitled "A plea for early operations in perityphlitic abscesses, with a case of laparotomy for perforation of the appendix vermiciformis." In this paper Weir stated that up to that time laparotomy had been performed for perforation of the intestine, not traumatic, 15 times, in 9 of which the perforation occurred in the appendix. Among these cases he reports that of Kronlein, who in 1884 removed a perforated appendix for the first time in the history of surgery. In the recapitulation, he submitted the following propositions: That the majority of perityphlitic abscesses are due to inflammation or perforation of the appendix and that the mortality in such lesions is greatest prior to the third day; that as soon as it can be recognized, pus should be evacuated, extraperitoneally, if possible, or by a lateral laparotomy, and the cavity drained; that if aspiration fails to detect pus where a tumor exists, it is wiser to make an early extraperitoneal laparotomy incision; that where general peritonitis is progressing, with any history of right iliac pain, a limited lateral or a medium laparotomy, preferably the former, should be made within 48 hours to explore the region of the appendix, and if pus is found it should be evacuated and a drainage-tube inserted without toilet of the peritoneum.

With regard to the treatment of the perforated appendix the method employed by Dr. Weir in his cases above reported is that which should be preferred,—ligature at the base of the appendix and excision. It is an efficient method, union taking place in the stump without difficulty, and it prevents the recurrence of morbid conditions.

Perforation of the cæcum should be treated by sutures as in other portions of the intestines. During the past year a number of cases of perforating appendicitis have been treated by laparotomy with ligature and amputation of the appendix. Dr. Woodbury⁶¹ reports a case of perityphlitic abscess in which Dr. Morton performed laparotomy and removed an "enormously enlarged appendix with an extensive perforation and containing a small hardened fecal mass about the size of a cherry stone." After the operation the patient recovered without an untoward symptom. In connection with the above, Dr. Morton reported another case in which

laparotomy was performed, two perforations being found in the appendix, which was greatly enlarged. Amputation was performed, a ligature having been applied at the base of the appendix. The patient did not recover from the shock of the operation, and died in a few hours.

The morbid anatomy, diagnosis and treatment of peri-cæcal inflammation formed the subjects of three separate papers read respectively by Drs. Musser, Pepper, and Morton before the Philadelphia County Medical Society, Dec. 14, 1887.⁶² In these papers the subjects were treated in a comprehensive manner and elicited discussion of an interesting and instructive character.

Perforating Typhoid Ulcers.—According to the statement of Dr. T. S. K. Morton,⁶³ Prof. Küssmaul of Strasburg was the first to perform laparotomy, excise and suture perforating typhoid ulcers, his operation dating Oct., 1885. Luecke⁶⁴ reports a case in which he performed laparotomy Oct. 22, 1885, for perforating typhoid ulcer. A rather large perforation was found, excised and the edges sutured. The abdominal cavity was washed out with salicyl water, a thick drainage tube introduced and the wound closed. Other ulcers could be seen in the ileum. The patient died in 7 hours. A pint of purulent fluid with a faecal odor was found in the pelvic cavity. Luecke suggests the performance of the operation in two stages, the intestine to be fastened to the abdominal wall in the first, and resection to be performed later. Drainage and irrigation with a disinfecting fluid he regards as important.

Another case was under the care of Mr. Bartlett, of Birmingham, in November, 1886, in which laparotomy was performed; the intestinal perforation was not found, abdominal cavity cleansed, drained and closed.

October 17, 1887, Dr. Bontecou,⁶⁵ of Troy, N. Y., performed laparotomy for perforating typhoid ulcer, found perforation of the appendix, which was ligated and excised, and also an oval perforation of the ileum about 10 inches from the colon. Intestinal perforation was closed by sutures of its "peritoneal surfaces," the abdominal cavity cleansed and closed. The patient died before recovering from the anæsthetic.

Dr. Thos. G. Morton⁶⁶ reports a case of perforating typhoid ulcer for the relief of which he performed laparotomy November 13,

1887. A perforation three eighths of an inch in diameter was found about three feet above the ileo-cæcal valve, occupying the lower end of a large ulcerated patch. The whole area of ulceration was turned into the lumen of the bowel without excision, and sutured with eight Lembert sutures. Another ulcer just above the cæcum presented, in a portion of its area, a gray aspect, as if of sphacelus, and, although no perforation at this point existed, it was thought prudent to turn in this ulcer area, which was done with six Lembert sutures. No other perforations could be found although ulcerations extended to quite a high point in the ileum. The intestine was greatly distended with gas. Arterial hyperæmia, with occasional recent ecchymosis, existed at various points and there was a state of general congestion throughout. The patient apparently reacted from the operation, becoming speedily conscious upon withdrawal of the anæsthetic. Six hours after he sank into a condition of collapse and died in an hour.

As having a bearing upon the question of surgical interference in perforating typhoid ulcer, it is of interest to consider, in connection with the conditions revealed post-mortem, the history of the patient. Dr. Morton states that this case was of that form commonly designated as a "walking" case, the patient being scarcely in bed until the last day and a half previous to his sudden death. It was at the end of the third week of the disease and his temperature had for several days been scarcely above the normal. The day before the operation he felt very well, ate a hearty meal of meat, etc., and in a few hours was seized with excruciating pain in the right lower portion of the abdomen, followed by a violent chill and elevation of pulse rate and temperature. The mild character of the disease in the above case and the time of its progress when perforation occurred, that of defervescence and convalescence would seem to have made it one of the most promising for successful result after surgical interference. In a case of such character one would expect to find a limited area of ulcerated patches in the intestine and a tone of system capable of enduring with minimum effect, the shock of operation. On the contrary, ulceration was found to exist high up in the ileum and death followed promptly upon surgical interference. Thus far, fatal results have occurred in every case submitted to operation and it is a very grave question whether the condition of any patient, even if he be in a state of

convalescence of the fever, will admit of successful surgical operation. There exists necessarily a very much debilitated and devitalized state of the system, reduced to the lowest point by the tissue destroying fever. That the patient is unable to withstand shock is seen in the sudden and profound impression made at the time of perforation, showing the extreme sensitiveness of the peritoneum, ready to rush the patient into collapse or later to explode into a fatal inflammation. Contrast these conditions with what is observed in persons in a state of health who are submitted to injury, through which the intestinal contents are poured into the peritoneal cavity. The existence of the inflammatory foci in the Peyer's patches of the ileum makes an impression upon the entire intestine, producing what Dr. Morton observed on post-mortem examination, a "general congestion and state of arterial hyperæmia." If ever, the peritoneum is at this time in a "noli me tangere" condition, a state of extreme irritation, quite different from that which exists in well established inflammation, and ready to resent promptly any interference, with the patient's powers of life much below par and with little or no capacity for resistance.

Dr. J. C. Wilson⁶⁷ pleads earnestly for operative interference in these cases and refers to what has been done by operations in penetrating shot wounds of the abdomen and in purulent peritonitis. He urges operative measures when perforation has occurred in "the period of convalescence, when the condition of the patient, except for a deep ulceration, often single, is tending toward recovery." "Unfortunately," he says, "this question is not to be settled by experiments upon animals. The investigation must be made upon the human subject. The courage to perform it will come of the knowledge that the only alternative is the patient's death."

The solution of the question had already been undertaken, for Kussmaul and Luecke, more than a year before, had performed laparotomy and sutured perforating typhoid ulcers, with fatal results. The suggestion of Luecke, the creation of an artificial anus with constant drainage and irrigation, and subsequent operation for its relief is valuable, and offers, without question, the best prospects for success in these cases.

Colotomy—Inguinal.—In an editorial article⁶⁸ of the *New York Medical Journal* the paper of Dr. C. B. Ball, of Dublin, on laparocolotomy and lumbar colotomy is discussed at length, the state-

ment "that recent advances in rectal surgery had limited the cases in which colotomy is indicated, and that where it is possible to perform them, ablation of the rectum, linear proctotomy, and resection of the colon are all to be preferred to the establishment of an artificial anus," is received, with possibly the exception of resection of the colon, as in accord with surgical opinion of to-day. There are cases in which the creation of an artificial anus is imperative and the surgeon can decide between the operation in the loin and that in the groin. The lumbar operation was devised and has until recently been practiced, because it presented the great advantage of avoiding a wound of the peritoneum, which at the present period of time was regarded as fatal. This advantage was to a great extent counterbalanced by difficulties in the operation. Modern surgical methods have removed that which was considered the greatest danger and enabled surgeons to transfer the site of operation to the groin, and to substitute an operation possessing positive advantages. These advantages are ease of performance, exploration of the abdominal cavity in case of doubt as to the seat of the disease or error in diagnosis, the facility with which excision can be done, if found necessary, smaller wound, more accurate coaptation of the integument and mucous membrane, owing to the fine structure of the former, and finally, the ease with which patients can cleanse themselves.

At the meeting of the New York Surgical Society, Jan. 12, 1887, Dr. Lange⁶⁹ presented two patients showing the results of inguinal colotomy. He called attention to the fact that in colotomy, inguinal as well as lumbar, in which merely a lateral opening in the intestine has been made, the contents will pass into the bowel below the wound and being forced upward by antiperistaltic action, will prolong defecation and render it difficult. Having experienced unsatisfactory results in operations performed in this manner, he had resorted to Madelung's method of complete section of the intestine, closure of the opening in the lower portion and suture of the upper end into the abdominal wound. So far as defecation was concerned, the result was perfect, two evacuations taking place daily and no annoyance occurring during the rest of the day. Fearing that danger might arise from retention in the closed portion of the intestine, he adopted the plan of Verneuil, of forming a spur which secured complete evacuation of the feces

and afforded at the same time access to the lower portion. Dr. Lange describes the technique of the inguinal operation, as follows:—The incision is made parallel with Poupart's ligament and about three centimetres (about one and a quarter inches) long above its outer third; the peritoneum is opened to the extent of not more than three or four centimetres; a loop of the colon, near the sigmoid flexure is brought into the wound and a coarse catgut ligature is passed under the bowel at the point of attachment of the mesentery, which serves as a handle and holds it in position. A spur is then formed by passing through a part of the intestinal wall on both sides of the mesentery a fine needle threaded with iodoform catgut, the line of sutures being about equal to the thickness of the abdominal wall. Then the opposed parietal and visceral peritoneal surfaces are brought in contact by similar sutures, thus shutting off the peritoneal cavity from the wound, and the loop of the intestine, so far as its peritoneal surfaces have been approximated by sutures, is secured above the level of the parietal peritoneum. The bowel is now opened by a transverse incision extending toward the attachment of the mesentery and the edges united to the integument by a few silk worm sutures. Care should be taken to form a sufficient spur in order to prevent passage of the feces into the lower portion of the bowel. In Dr. Lange's cases, defecation occurred once or twice daily and gave very little trouble, occupying only a few minutes. Inguinal colotomy commends itself as in every way preferable to the old operation and should be employed in its place.

LIVER AND GALL BLADDER.

Wounds of the Liver.—In the cases of gunshot wounds of the abdomen, under the care of Dr. Keen, cited above, there was a slight scalloped wound of the liver across the anterior border from which hemorrhage did not occur and which did not require treatment. In severe lacerated wounds, Senn has suggested plugging with a tampon of iodoform gauze. The Paquelin cautery may be applied or an effort may be made to gain sufficient pressure to control hæmorrhage, by the introduction of deep catgut sutures. In stab wounds, firm bandaging so as to oppose the surface of the liver and the abdominal walls, may be of service in checking hæmorrhage.

Hydatid Cysts.—Mr. Barwell's⁷⁰ paper on hydatid cysts of the liver, read before the Medico-Chirurgical Society of London elicited an interesting discussion with regard to the best method of dealing with these tumors of the liver. Tapping, the operation which has, as a rule, been resorted to, is of little avail in effecting relief in the multiple form of the disease. Fortunately, this variety is rare, the cysts usually being single and superficially placed so as to be readily reached by operative procedures. In his statement of the affection, Mr. Barwell proposed to avail himself of all the advantages afforded by modern surgical methods,—to employ such procedures as would place the surgeon in full control of the condition so far as was possible. He advocated, therefore, incision and drainage, the operation to be performed in two stages,—as in gastrotomy,—the liver to be sutured to the edges of the incision and, when union has taken place, in from three to four days, to open the cyst and empty its contents. Secondary cysts projecting into the primary cysts should be incised and drained. The removal of the mother ecto-cyst is to be undertaken with care, if at all, as the vessels in the adventitious cysts are large and varicose, and serious hæmorrhage may follow the attempt. When suppuration has occurred, irrigation should be instituted.

Mr. Owen⁷¹ records a case of hydatid cyst which occupied the upper surface of the right lobe of the liver and which he opened and drained across the pleural space. Aspiration had been performed with the effect of removing several pints of fluid containing hooklets. Fearing that the cyst would rupture into the thorax, and as it was concealed behind the lower ribs, it was decided to incise it through the pleural cavity. Accordingly, an incision was made in the eighth intercostal space opening the cavity and the finger introduced felt the diaphragm bulging up along the inner surface of the chest wall. The diaphragm was incised and a tense cyst could be readily felt. A quantity of fluid was removed by aspiration, which relaxed the cyst wall so that it could be drawn up through the opening and fastened to the integument by four hair-lip pins. Between the phrenic and costal pleura, thus brought into apposition, adhesion occurred and the pleural cavity was completely excluded. On the fourth day the cyst was incised, giving exit to bile stained fluid and masses of disintegrated cyst wall. A large drainage-tube was inserted and daily irrigation, with warm iodine

water was made, removing pieces of cyst wall. The patient made a complete recovery.

Abscess of the Liver.—M. Rochard⁷² declared at a meeting of the Paris Académie de Médecine that the best way of treating abscess of the liver was by free incision, washing out the cavity with antiseptic fluid and drainage, with antiseptic dressing to the wound. M. Trélat advises suture of the liver wound to the edges of the skin wound. The danger of simple puncture arose from the fact that it was not aseptic.

GALL BLADDER.

Cholecystotomy-Cholecystectomy.—In discussing the operation of cholecystotomy, Prof. Hofmøkel⁷³ of Vienna stated at a meeting of the Imperial Society of Physicians of Vienna, that besides traumatic injuries of the gall bladder, obstructions of the biliary ducts by calculi, especially of the ductus communis choledochus, presented indications for operation. Puncturing the bladder in cases of difficult diagnosis he regarded as dangerous, incision being a safer plan. Cholecystotomy with drainage, the bladder being sutured to the abdominal walls, is to be preferred to cholecystotomy and return of the bladder to the abdominal cavity. No general rule could be given with regard to the operations of cholecystotomy and cholecystectomy, the method of procedure depending on the nature of the case. "When the gall bladder was quite movable, and had sound walls and a free ductus cysticus and ductus choledochus, the extirpation must be resorted to, but on the other hand, cholecystotomy must be preferred when the mobility of the bladder was impaired, its walls thickened, its pedicle enlarged," etc.

At the 16th Congress of German Surgeons,⁷⁴ Kuester advocated cholecystotomy without the formation of a fistula. In cases of empyema he advised cholecystectomy; in other conditions he thought it unnecessary to resort to this operation. Tischendorf, of Leipzig, reported a successful case of extirpation of the gall bladder, and Tillmann also one of extirpation, with a fatal case in which he performed incision, the patient being the subject of carcinoma of the liver. He thought that it was not possible to pronounce definitely with regard to the operations of cholecystotomy and cholecystectomy. Each case must make a decision for itself.

Langenbuch urged cholecystectomy as a radical operation, relieving the patient of the danger of a recurrence of a condition of which the gall bladder is the seat. Incision was palliative. He regarded cholecystotomy without the formation of a fistula as advised by Kuester, as dangerous, since it was possible for the bile to escape through the wound in the gall bladder. If incision is practiced, it is in every case preferable to make the opening in the free extremity and surround it with a circular ligature in place of sutures. He did not believe that any very serious functional conditions could arise from total extirpation of the gall bladder, as its function was not obscure as compared with a glandular organ like the thyroid gland or spleen.

Langenbuch⁷⁵ reports two cases of cholecystectomy with remarks upon the pathology of cholelithiasis, the occurrence of a form of intermittent fever as a consequence of chronic inflammatory processes in the bile ducts and the tendency to hæmorrhages associated with the affection. In one of the cases reported, which terminated fatally, two gall stones occupied the common duct and could not be pushed back into the gall bladder. They were therefore crushed, one with the fingers and the other with the lithotomy forceps, the blades being enclosed in antiseptic tinner. The fragments were returned to the gall bladder and it was removed. Crushing the stones should be done carefully so as to avoid wounding the duct. When hæmorrhage occurs the cautery should be employed and if the form of intermittent fever above referred to exists, the operation should be done in the apyrexial intervals. Lithotripsy in the common bile duct was first suggested by Lawson Tait in 1884, and first performed by Langenbuch.

Cholecystenterostomy.—In cases of permanent closure of the common duct through disease, or by pressure of growths of adjacent organs, the operation of cholecystenterostomy is indicated. It was suggested by Nussbaum in 1880 and first performed by Winiwarter in 1881, and consists in the formation of a fistulous opening between the gall bladder and duodenum, thus establishing a new route for the bile into the intestine. Kappeler⁷⁶ reports a successful result after this operation, in a man 55 years of age, who suffered from obstructive icterus which was found, at the operation, to be caused by the pressure of a tumor of the pancreas upon the

common bile duct. The distended gall bladder was incised, emptied and the opening sutured to a corresponding one in the duodenum.

PANCREAS.

Premeditated operations upon the pancreas, except in cases of cystic distension and abscess, are of rare occurrence. The elaborate researches of Senn have shown that total extirpation of the organ is an operation fraught with great danger and surrounded with innumerable difficulties, rendering its accomplishment, in most cases, impossible. As one of the propositions deduced from his experimental investigations, he states that complete extirpation of the pancreas is invariably followed by death, produced either by the traumatism or gangrene of the duodenum. Partial excision of the organ for injury or disease is a feasible and justifiable surgical procedure. The formation of an external pancreatic fistula by abdominal section is indicated in the treatment of cysts, abscesses, gangrene, and hæmorrhage of the pancreas due to local causes.

Kuester⁷⁷ reports a case of pancreatic cyst in which the diagnosis was made prior to operation, abdominal section performed, the cyst incised and the opening sutured to the abdominal wound. The cavity of the cyst was washed out, and the wall rubbed with iodoform. Uninterrupted recovery took place. In reporting this case, the questions of etiology, symptoms and treatment of pancreatic cysts were discussed. Among the symptoms of pancreatic cyst celiac neuralgia, taking origin in the celiac plexus, is noted as prominent. The occurrence of diabetes with pancreatic cyst indicates some secondary affection of the solar ganglion. In 11 reported cases of pancreatic cyst, pancreatic salivation or increase of the saliva was absent; there was also an absence of steatorrhœa or increase of fat. In making a diagnosis, cystic tumors of the liver and spleen, dropsy of the gall bladder and aneurism of the abdominal aorta should be carefully excluded. There should be little or no difficulty in differentiating cystic tumors of the pelvic organs of the female, owing to the information furnished by the history of the point of origin. Pancreatic cysts appear in the upper region of the abdomen, above the level of the umbilicus and between the upper and middle zones of the abdominal cavity. Cystic tumors of the ovaries seldom reach the position of the pancreatic cysts and the

latter rarely descend so low in the abdomen as to obliterate a line of percussion resonance over the brim of the pelvis. Examination of the fluid obtained by tapping will assist in determining the nature of the growth. The presence of blood might indicate an ovarian cyst, in which event the tumor would be small, as this condition is due to twist of the pedicle, which is only possible in small tumors. A large cyst containing blood is likely to be pancreatic. The detection of the hooklets in the fluid taken from a large cyst, indicate echinococcus cysts of either liver or spleen. Lymph cysts contain a milky fluid which can be easily distinguished. Careful auscultation and palpation should not fail to make the presence of an aneurism clear. Distended gall bladders seldom pass beyond the median line. Careful consideration of the above points should render the diagnosis of pancreatic cysts, by exclusion, not difficult.

Three plans of treatment have been practiced: Tapping; total extirpation; incision, with sutures of the walls of the cyst to the abdominal wound, and drainage with irrigations, if necessary.

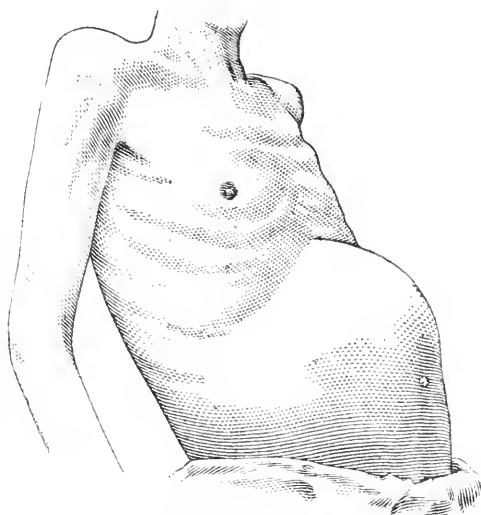
The first method is only palliative and is attended with some danger. The second method involves the performance of a very difficult operation, owing to the intimate relations existing between the pancreas and adjacent organs, provoking hæmorrhage of almost uncontrollable character and causing such injury to surrounding structures as to lead to destructive inflammation. Of the 11 reported cases submitted to operation, extirpation was performed in 5 with 4 deaths. Operation by incision and sutures of the walls of the abdominal wound, was done in the remaining 6 cases with recovery in all.

Dr. Bull⁷⁸ reports a case of pancreatic cyst treated successfully by incision and drainage. (See fig.) Careful study of the symptoms presented in the case, with physical exploration and chemical and microscopical examination of the fluid withdrawn by hypodermic syringe, made the diagnosis very clear. The operation was performed in two stages; the first, comprising incision of the abdominal wall in the linea alba four inches in length upwards from the umbilicus and suture of the cyst to the wound. The second, after the formation of adhesions between the cyst and abdominal wall, consisted in opening the cyst and draining it. This opening was made partly with the Paquelin cautery and then a large trocar and

canula were thrust into the cyst, evacuating 118 ounces of dark brown fluid. Forty-eight hours after the operation the sac was irrigated through two large rubber tubes, once or twice daily, with warm water. The discharge gradually diminished, became pale in color, and the cavity contracted. Two months later the sinus was only four inches deep and the discharge through the small drainage tube which now occupied it, was only a few drachms daily. Four months after, the patient was discharged from the hospital, the sinus being two and a half inches deep and the daily secretion but a few drops. Death occurred two weeks later from diabetes.

A summary of the more important features observed in connection with the examination of the fluid gives: digestion of starch, emulsion of fat, spectrum of blood pigment (Methaemoglobin), large quantity of sugar,—2.70 per cent.,—large quantity of serum albumin,—2.21 per cent.,—large quantity of free cells resembling leucocytes, etc.

M. Subbotich⁷⁹ made a communication to the Society of Physicians of Buda-Pesth upon a case of pancreatic cyst treated by incision and drainage with



PANCREATIC CYST.—(*Phila. Med. News.*)

a successful result. He states that of 14 cases reported in medical literature, the diagnosis was made in but 3, prior to opening the abdomen. In his case the operation was done in two stages, the cyst being opened with the thermo-cautery 14 days after it had been sutured to the abdominal wound. Two litres of a thick, brownish fluid were evacuated, which contained blood globules, fatty granules and transformed a large quantity of starch into sugar. A drainage-tube was introduced. In one and a half months the patient was completely recovered and the sinus closed.

Dr. Senn,⁸⁰ in a letter from Heidelberg, reports briefly a case

of primary carcinoma of the head of the pancreas which had been subjected to abdominal section for diagnostic purposes. After abdominal section the nature of the affection and the involvement of adjacent organs was made evident by inspection and palpation and the operation was abandoned. It is of interest to note that profuse salivation was the most prominent symptom in the case.

SPLEEN.

Wounds.—The large vascular supply of the spleen and its anatomical structure, contribute to the occurrence of free and sometimes uncontrollable hæmorrhage in cases of wounds or injuries, involving laceration. Extirpation of the organ is therefore advised in instances of serious hæmorrhage. It is sometimes possible in slight wounds, to control the bleeding by the administration of ergot or by laparotomy and the introduction of deep catgut sutures, or by the application of the thermo-cautery.

Dr. Hyer⁸¹ reports a case of incised wound of the spleen in which very free hæmorrhage occurred and which was controlled by the administration of a hypodermic syringe full of fluid extract of ergot by the patient himself, who was a physician.

Hydatid Cysts of the Spleen.—Dr. Thomas⁸² relates a case of a woman, the subject of an abdominal tumor, diagnosed to be an hydatid cyst of the spleen, in whom aspiration was practiced and collapse supervened upon the operation, from which condition the patient was brought by active treatment. He called attention to the dangers which may arise in puncture of cysts of this organ.

Splenectomy.—This operation has been practiced for various affections of the spleen with widely different results—as cysts, dislocation producing the floating or wandering spleen; simple hypertrophy; paludal or malarial hypertrophy; leukæmic spleen. For traumatism, resulting usually in hernia of the organ, Ashhurst,⁸³ quoted by Morris, gives 21 cases with 21 recoveries.

Heydenreich⁸⁴ discusses in detail, the question of splenectomy with regard to its effects upon the functions of the patient, the methods and results of operation and the affections in which it may be regarded justifiable. He gives an affirmative response to the inquiry whether ablation of the spleen is compatible with human life. He describes the operation, analyzes the causes of death, collates the mortality rate in each affection, and concludes that the oper-

ation is justifiable and if the morbid condition is not leukaemic or malarial in form, it is not more serious than certain operations which to-day are universally admitted.

Dr. W. H. Myers⁸⁵ reports a case of splenectomy for wandering spleen. The displaced organ, weighing seven pounds, was found occupying a position on the left brim of the pelvis, lying in an abscess which had opened by three sinuses upon the abdominal wall. The pedicle was secured without difficulty, and the hæmorrhage which occurred during the operation was not serious. The symptoms which accompanied the case indicated that the hypertrophy was of a malarial origin. The patient recovered rapidly, leaving the hospital in three weeks after the operation.

Dr. McCann⁸⁶ made a communication upon a case of floating spleen in which splenectomy was performed with a successful result. The history of the patient, a woman aged 29, showed that she had suffered from a number of abortions, as well as frequent attacks of hematemesis, which finally reduced her to a state of extreme emaciation and anæmia. A freely movable tumor could be distinctly outlined, occupying the left iliac region and extending deeply into the cavity of the pelvis. The patient stated that this tumor, just before a hæmorrhage, would become considerably enlarged, and during an attack would pulsate violently and diminish in size. During the intervals between the attacks it would regain its size and so remain without any evidence of pulsation. After the administration of tonics for a period of three weeks, her condition was improved and laparotomy was performed, removing the organ, which weighed 14 ounces, without much loss of blood. Examination of the blood after operation showed a slight increase in the number of the white blood corpuscles. There was no enlargement of the liver, thyroid or lymphatic glands. Her convalescence was retarded by an attack of phlebitis, involving the left femoral and saphenous vein. This subsided under an anodyne, astringent and tonic plan of treatment, and she left the hospital 33 days after the operation in a good state of health.

Trendelenburg reports a case in which he wounded the spleen during an operation for removal of a retroperitoneal sarcoma. The patient died in 3 months from hydræmia.

Dr. Gross⁸⁷ in a recent editorial, presents an analysis of all the

reported splenectomies to date. The operation has been resorted to in 5 cases of cysts with 1 death; in one case of sarcoma with success; in 13 cases of wandering or floating spleen with 2 deaths, one from twisting of the stomach and one from collapse; in simple hypertrophy (so called) 14 times with 13 deaths—8 from hæmorrhage, 2 from shock, 1 from peritonitis, 1 from septicæmia and 1 from cirrhosis of the liver; in malarial hypertrophy, 3 times with 3 deaths—1 from septic peritonitis, 1 from shock and 1 from parenchymatous nephritis; in leukæmia 20 times with 1 recovery, and in that case operation was performed when the disease was in its incipient stage. Of the deaths, 14 were due to hæmorrhage, occurring during the operation or within 36 hours; 3 to shock, 1 to septicæmia and 1 to exhaustion. In a majority of cases the hæmorrhage arose from the separation of adhesions or rents of the organ. Slipping of the ligature caused death in one case of fatal hæmorrhage. Of the total cases,—56,—38 died, giving a mortality of 67.87 per cent. The mortality in leukæmic enlargement is 95 per cent.; in malarial hypertrophy, 100 per cent. In leukæmic and simple enlargement, hæmorrhage was the cause of death in 68.75 per cent. and as it was nearly as frequent in the latter as in the former, it is quite possible that leukæmia existed in a number of instances recorded as simple hypertrophy.

The conclusions deduced from this study of cases may be stated as follows:—

1. Splenectomy is indicated in cases of cysts and floating spleen.

2. In all cases of enlargement it should not be resorted to, no matter what may be the cause of hypertrophy.

3. If it is undertaken in simple hypertrophy, a careful examination of the blood should be made prior to the operation to determine that leukaemia does not exist. If then operation is made, the utmost care should be exercised in securing divided vessels and in adopting means to control capillary oozing.

KIDNEYS.

Since the beginning of the recent active work in abdominal surgery, the kidneys have, with the exception of the genitalia in the female, been subjected more frequently to operative interference than any other organ of the cavity. The current literature

contains the report of many cases submitted to surgical procedures for the various conditions presented, with important discussions upon the question of diagnosis, justifiability of surgical interference and methods of operation. The valuable paper of Dr. S. W. Gross⁸⁸ contains a critical review of the whole subject up to 1885, based upon careful analysis of all reported, and a number of unpublished, cases. Increasing experience has fully confirmed the clearly expressed propositions formulated at that time by Dr. Gross and defined the limits of surgical interference.

Mr. Henry Morris, in his able article in the "Encyclopedia of Surgery," has contributed valuable information upon the subject and influenced the practice of surgeons by his views and practice, as is manifested by the increasing number of recorded cases.

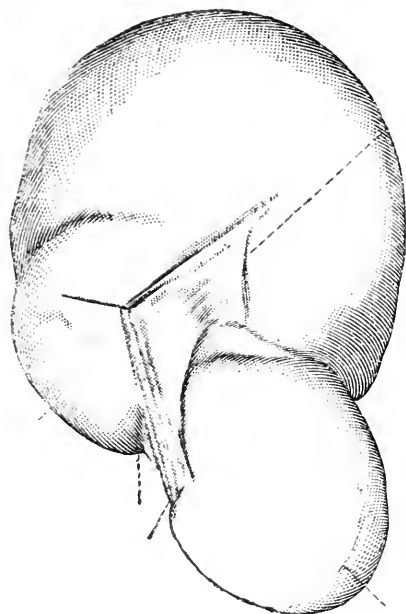
Injuries of the Kidneys.—Dr. Otis⁸⁹ in a very able paper upon "injuries of and operations upon the kidneys" discusses at length the causes, diagnosis and treatment of injuries of the kidney. Blows, crushes, or falls are enumerated as the principal causes and hæmaturia, profuse or slight, pain in the loins, with collapse in severe cases, are the distinguishing features of injury. In simple contusion of the organ, the symptoms soon disappear and the patient is well, confirming thus the experience of Mr. Harrison, who says that "laceration of the kidney is a lesion more frequently recovered from than any corresponding one of an internal organ." Absolute rest in bed, local application of cold, internal administration of opium and astringents—chief among them ergot—are the means to be employed in checking hæmorrhage. Catheterization will be required to relieve the bladder of blood, clots being broken up by the lithotrite or dissolved by injection of a pepsin solution. In some cases cystotomy may have to be performed to remove clots. Strong collapse and swelling in the region of the injured kidney indicate, according to Simon, surgical interference by abdominal or lumbar incision, ligature of the bleeding vessels, and if the injury is one of very serious character the lacerated organ should be removed.

Five cases are recorded by Weir in which nephrectomy was done for injury, with three recoveries. Compound injuries—injuries inflicted by firearms or penetrating instruments—are characterized by hæmaturia and escape of urine from the wound. Treatment is to be conducted in same manner as in subparietal injuries. 78

cases are recorded in the Medical and Surgical History of the War of the Rebellion, with 26 recoveries. In none of the 78 cases were operations performed.

Dr. Otis has contributed 27 cases, from 1879 to 1887, of kidney injuries, giving 11 recoveries and 16 deaths. These added to those collected by Maas,⁹⁰ 71 cases, with 37 recoveries, and 34 deaths, give 98 cases with 50 deaths,—a mortality of 51.02 per cent. for subparietal injuries.

Floating Kidney—Nephrorraphy.—The failure in many instances to secure the wandering organ permanently by sutures through the capsule to the abdominal wound, induced Dr. Lloyd⁹¹ to adopt a method which appeared, in the case in which it was employed, to possess advantages over other procedures. The kidney being exposed by the lumbar incision, a portion of the capsule over an area of one inch in diameter was stripped off, and two stout catgut sutures were carried by a medium sized curved needle through the edges of the lumbar incision, the capsule proper and kidney substance close to one edge of the exposed area, passing completely across and beneath this area and emerging at the point corresponding to that of its entry on



HYDATID CYST OF THE LEFT KIDNEY.
(Gaz. Med. de Strasbourg.)

the opposite side and thence through the edge of the lumbar incision to the surface. The wound was closed by deep silver sutures and then the transfixing gut ligatures were securely tied, thus bringing the raw kidney surface in close contact with the under surface of the wound through the parietes. After several months the result was found to be perfectly satisfactory, the kidney being firmly at anchor and free from the slightest movement.

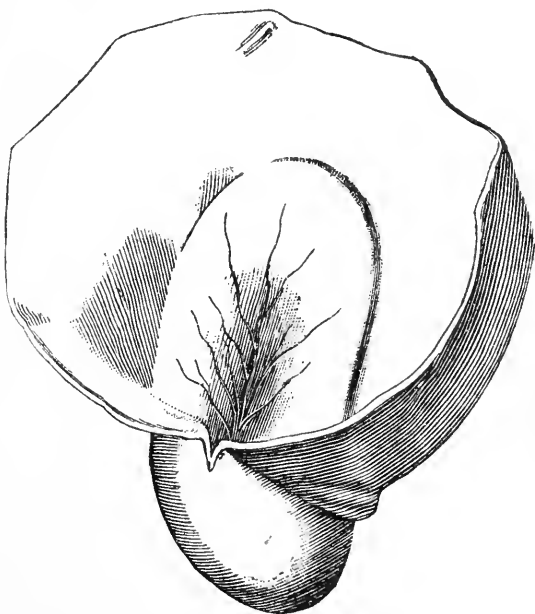
When mechanical appliances and the operation of nephrorraphy fail to retain the dislocated organ in its position, and

especially in cases of painful floating kidney, nephrectomy is demanded, preferably by the lumbar incision.

Hydro-Nephrosis—Cysts—Hydatid Cysts.—As the treatment in the above affections is practically the same, they may in this respect be placed in the same group. In all there is cystic distension of the organ. In hydro-nephrosis or renal dropsy, the urine accumulates in the kidney owing to obstruction in some form, converting the organ into a sac of greater or less size. Cystic disease or cystic degeneration originating in the uriniferous tubules or in Bowman's capsule occurs most frequently in the foetus and may be single or multiple.

Boeckel⁹² contributes a very full and complete paper upon "Hydatid cysts of the kidney from a surgical point of view." (See fig.) He discusses among other points the etiology, symptoms, diagnosis, and treatment of the affection. With regard to the rare occurrence of the disease, he cites the statistics of Davaine who, in a total of 566 cases of hydatid cysts, found but 30 implicating the kidney. In 983 cases, Neisser gives 80 in the kidney, against 451 in the liver. Thomas, in 307 post-mortem examinations in Australia, found hydatid cysts of the kidney in 2 cases, in the liver 166 and in the lung 53.

Where hydatids are found in the urine the diagnosis is easily made; otherwise aspiration of the kidney and examination of the fluid removed are necessary to decide the character of the cystic growth. Of 21 cases collected by Boeckel, in which operations were done, 14 recovered and 7 died. In 17 cases puncture, double puncture and incision, incision with suture of the sac, were done



VERTICAL SECTION OF THE SAME.
(Gaz. Med. de Strasbourg.)

with 12 recoveries and 5 deaths,—a mortality of 29.4 per cent. In 4 cases, abdominal incision with nephrectomy gave 1 recovery and 3 deaths,—a mortality of 75 per cent. Eight of the 17 cases were operated upon by puncture simple,—1 case, 1 death; 2 by cauterizations to secure adhesions between the cyst and abdominal wall and then puncture, 1 recovery and 1 death; 5 by double puncture and union of the intervening space by incision, 2 recoveries and 3 deaths.

Of the remaining 9 cases of the 17, abdominal incision with evacuation of the cyst and suture to the abdominal walls, was done in 3 cases,—3 recoveries. Of the remaining 6 cases there were 2 lumbar nephrotomies—3 lateral and 1 abdominal—and 6 recoveries.

It is quite evident from the above that lumbar nephrotomy with drainage and irrigation of the sac, if needed, is the form of operative procedure to be employed in cases of hydatid cysts of the kidney.

Abscess—Pyonephrosis—Pyelitis.—In recent operations upon the kidney for suppurative lesions, an important aid to diagnosis has been employed in the catheterization of the ureters. This operation which at first would seem to be difficult of performance, is found to be very easily accomplished in the female with a Pawlick catheter, “two ridges, which can be readily felt on the anterior wall of the vagina, serving as useful and reliable guides, which lead the catheter directly to the ureteral orifices.” In the male the operation is somewhat more difficult; the guides, however, may be felt through the wall of the rectum. By the catheterization of the ureters the origin of pus found in the urine may be detected, the secretions from each kidney being collected separately and submitted to examination.

With regard to treatment, increasing experience shows that nephrotomy with drainage by the lumbar incision gives the best results. If a permanent fistula remains and is a source of discomfort, the contracted sac can be extirpated easily and with little danger. The analysis of Dr. Gross gives 73 nephrectomies for suppurative lesions from all causes, with 41 recoveries and 32 deaths,—a mortality of 43.97 per cent. and 93 nephrotomies with 71 recoveries and 22 deaths,—a mortality of 23.65 per cent. Of the 73 nephrectomies, in 12 previous nephrotomy had been performed, with 1 death,—8.33 per cent. In 61, without previous incision and drainage 31 or 50.81 per cent. perished.

Tubercular Kidney.—Mr. Clark⁹³ discussed, in a paper read

before the Medico-Chirurgical Society of Glasgow, the question of operation in the so-called scrofulous or tubercular kidney, illustrating his remarks by a case in which he had operated with a successful result. He quotes the statement of Gross that a mortality of 40 per cent. had attended the removal of the kidney in this affection; of the 8 dying from the immediate effects of the operation, in 5 tubercle was found to exist in the other kidney, bladder or other organ, and of the 10 recovering from the operation, two died within a few months from tuberculosis, thus making the actual mortality 50 per cent. The sound condition of the second kidney becomes, therefore, an important factor in obtaining a favorable issue. Morris,⁹⁴ although familiar with the use of the ureteral catheter in determining the condition of the kidneys, regards the investigation of the condition of the second kidney as surrounded with uncertainties. Dr. Clark, in the case detailed, employed the catheter and found that the operation of withdrawing urine from each ureter separately was simple, and the result of the investigation of the urine was satisfactory and decisive. He believes that "we must rely very much upon the results of using the ureteral catheters as our guide in nephrectomy in scrofulous cases," and if reliable results are obtained a great reduction in the mortality will follow. Attention is further directed to the relative frequency with which both kidneys are affected or one alone, in children and adults. Of 28 recorded cases in children under 12 years of age, in 19 both kidneys were affected and in 9, one only. In 67 cases over 12 years of age, both kidneys were involved in 28, and one only in 39,—a percentage of 67.8 in children and 41.8 in adults. In children, miliary or disseminated tuberculosis is far more common than the caseous or scrofulous form, and for this reason operative interference is likely to be followed by fatal results. Disseminated tuberculosis rarely produces distinct kidney symptoms, and therefore cases in which this form exists are less liable to come under the surgeon's care and become the subjects of operative interference. A consideration of the above points will assist materially in arriving at a diagnosis with regard to the involvement of one or both kidneys in the tubercular form of disease. Catheterization of the ureters, the age of the patient, and the existence of disseminated or of caseous tuberculosis become important factors in the diagnosis.

With regard to treatment, Gross advises in the early stage of the disease, extirpation by the ventral incision, as this method affords opportunity to examine the condition of the other kidney and may relieve the patient of a source of general infection. In advanced cases, especially if the disease is not limited to the kidney, nephrectomy should be resorted to, nephrectomy being clearly unjustifiable.

Malignant Growths.—*Carcinoma.*—Israel⁹⁵ reports a case of early extirpation of the kidney for carcinoma with successful results, in a patient 21 years of age. The especial interest in this case was the early period at which the tumor was recognized, the size being that of a half cherry at the time of removal and the kidney of normal size and position. Palpation was practiced with the patient on the right side and a pillow under the loins. On deep inspiration the lower border of the left kidney could be felt, by pressing the finger below the anterior junction of the 11th and 12th ribs. The palpation of kidneys of small size is facilitated by raising the head end of the table.

Stetter, in the same journal, reports a successful nephrectomy in a case of carcinoma of the kidney.

A careful histological examination was made by M. Cornil⁹⁶ of a hæmorrhagic epithelial tumor removed from a patient by M. Péan. Described under the name of adenomas and classed with benign growths, these tumors conduct themselves clinically as carcinomas and should be extirpated.

Prof. Albert,⁹⁷ of Vienna, removed, with successful results, an adeno-carcinoma of the right kidney weighing 840 grammes. A smooth, solid movable tumor could be felt in the right hypogastric region and could be pushed back into the fossa of the right lumbar region. Catheterization of the ureters could not be accomplished on account of the formation of well developed trabeculae. Blood corpuscles were found in the urine, which was otherwise normal.

M. Bouilly⁹⁸ removed by transperitoneal nephrectomy, a large kidney tumor measuring 22 centimetres in its vertical diameter and 12 to 14 centimetres in thickness. It presented to the eye the appearance of encephaloid cancer. Drainage through the loin, and also anteriorly, was practiced.

The statistics of Gross (loc. cit.) show in a general way that in the carcinomatous and sarcomatous kidneys, 61.22 per cent. of all cases died as a direct result of the operation for removal; that

16.22 per cent. perished subsequently, that 12.24 per cent. appeared to make a permanent recovery and that the lumbar incision gives better results than the ventral. In order to determine the true value of nephrectomy in malignant disease it is necessary, he states, to examine carcinoma and sarcoma separately.

In sarcoma at all periods of life, 57.57 per cent. died as the direct result of the operation; 42.85 per cent. died subsequently and 35.71 per cent. remained well for 31 and a half months on an average. In children under 7 years of age, 56.25 per cent. perished; of 7 survivors out of 16, 4 died before the expiration of 18 months; one was living with recurrence at 4 months; the history of the remaining two was not given. Of 17 adults, 7 recovered, and 10 or 58.82 per cent. died; of those surviving, one died of metastasis, 1 of an undetermined cause, and 5 were well at the end of 31 and a half months. The conclusion is, therefore, that for sarcoma in children, nephrectomy should not be done, while in adults it is justifiable and should be performed by the lumbar incision if the tumor is small.

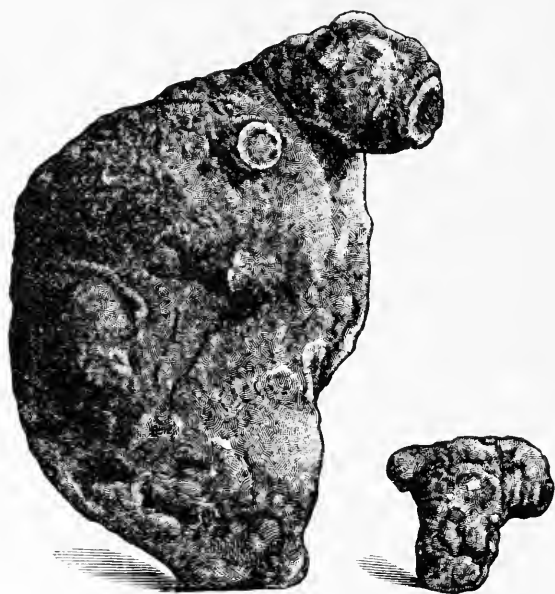
In carcinoma 71.42 per cent. died; of 4 survivors out of 14 cases, 2 were alive at the end of 2 and 13 months. Nephrectomy is, therefore, contra-indicated in carcinoma of adults.

Calculus—Nephro-lithotomy.—Prof. Agnew⁹⁹ reports a case of renal calculus in which he performed nephro-lithotomy, in a patient 37 years of age, removing a stone composed chiefly of phosphate of lime and uric acid, weighing 275 grains.

The lumbar incision was employed, beginning at the edge of the erector spinæ muscles and carried obliquely forward and downward, half an inch below, and parallel with the last rib. On breaking into the envelope of adipose tissue, a quantity of pus escaped, which had evidently been confined for some time about the kidney. A careful exploration was made by the finger for the suspected stone,—at first without success. A hard point was on re-examination detected and on scratching away the tissue the stone was found. It filled up the pelvis of the kidney and sent its prolongations into the infundibula. A drainage-tube was introduced into the pelvis of the kidney and remained in position for two weeks, being gradually removed.

Dr. Sheppard¹⁰⁰ describes a case in which he removed an enormous calculus from the pelvis of the left kidney by lumbar

incision, the stone with fragments weighing 4 oz. 7 drachms, and measuring $3\frac{1}{2}$ inches in length, and 9 inches in circumference. It consisted entirely of triple phosphate. For a time the patient's condition was favorable. High temperature occurring, the wound was reopened and the pelvis of the kidney explored without result. It was decided to perform nephrectomy, but a marked improvement took place and the operation was not done. Later the patient became worse, jaundice suddenly occurring, and died comatose, three and a half months after the operation. Post-mortem examination showed that the left kidney was greatly enlarged, forming a fluctuating mass weighing nearly 1000 grammes.



NEPHRITIC CALCULUS.—(*Phil. Med. News.*)

On incision along its convexity, it was found "to consist in the upper portion of a series of large communicating sacs containing over ten ounces of fetid pus." Five or six irregular branched calculi, varying in size from a bean to a walnut, were found in these sacs which did not communicate with the pelvis of the kidneys or with the sinus left after operation. The right kidney was double the normal size and appeared healthy.

In commenting upon this case and the result which followed operation, Dr. Sheppard calls attention to the great importance of thorough exploration in the calculous kidneys by finger, needle or

incision in order that no points of disease may escape. No fear need be had with regard to free incision in kidneys disorganized by disease or even in healthy kidneys, the hæmorrhage being easily and permanently controlled by pressure. In the case reported the continuation of the unfavorable symptoms indicated free exploration and nephrectomy. The high position of the kidney and the adhesions which existed, interfered greatly with its proper exploration and if it had been decided upon, its removal by the lumbar incision would have been difficult. It is stated that the stone in this case is the largest yet removed by lumbar incision.

In Sept., 1885, Mr. Victor Horsley¹⁰¹ removed successfully a stone weighing two and a half ounces from pelvis of the kidney. Up to that time, it was the largest stone removed from the kidney.

Mr. Brown removed from a kidney tumor containing three pints of pus, by abdominal section, a stone weighing 11 ounces.

Dr. Tiffany¹⁰² reports a successful case of nephro-lithotomy during the fifth month of pregnancy. For several years the patient, aged 27, had suffered from pain in the left loin, shooting down to the groin, with a small quantity of pus in the urine but no blood. After a severe fall upon the buttocks the symptoms increased, accompanied by vomiting, elevation of pulse and temperature and restlessness. The pus in the urine increased greatly. The kidney was exposed by the lumbar incision below and parallel to the last rib and an elastic spot was found just under the rib. The spot was incised and gave vent to ill-smelling pus. The abscess cavity was explored with a probe which passed into the pelvis and came in contact with a calculus. Dr. Tiffany believes that the abscess did not communicate with the pelvis of the kidney, having been formed strictly within the kidney tissue in a Malpighian pyramid, and that the stone, lodged in a calyx, closed the outlet. The probe passed into the pelvis through a corresponding papilla and struck the calculus. The origin of the pus in the urine is not explained. The case is regarded as the first reported of nephro-lithotomy upon a pregnant female.

Mr. Page¹⁰³ reports a successful case of nephro-lithotomy in a youth aged 15 years. Hæmaturia had existed to a greater or less degree since the patient was four years of age. Pain was a more marked symptom than bloody urine. It started in the left loin, passed around the belly into the left testicle and down the inner

side of the left thigh, accompanied by retraction of the left testicle. After exposure of the kidney by a lumbar incision at right angles to the spine, it was explored at different points by a needle and the stone detected. Considerable hæmorrhage accompanied the extraction of the calculus. Recovery was somewhat retarded by an attack of double capillary bronchitis, with pleurisy, due it was thought to the chilling effects of the spray used during the operation.

The choice of incision in nephrolithotomy was the subject of discussion at the Clinical Society of London. Mr. Thornton advocated a combined method,—ventral and lumbar incision. Error in diagnosis as to the kidney involved may be avoided by the abdominal incision, and the lumbar may be employed for removal of the organ. Mr. Henry Morris preferred the lumbar incision and could not accept the advantages claimed for the double operation.

Transperitoneal Nephrectomy.—M. Terrier, in order to combine the advantages of the abdominal and lumbar incisions, advises a new method which is described as the transperitoneal. By this method the kidney is reached by the ventral incision, the overlying peritoneum incised, reflected and carefully sutured to the abdominal wound, in this way entirely shutting off the peritoneal cavity. The divided ureter is brought out of the lower angle of the wound, a drainage-tube introduced and the wound closed. The advantages of this method of operation¹⁰⁴ are “the facilities afforded for determining the condition of the opposite kidney, abundant room for extracting the kidney, ease in dealing with the pedicle, satisfactory drainage of the wound which is rendered extraperitoneal, and the freedom from risk of contaminating the peritoneum by the divided ureter.”

The study of the operations performed upon the kidney for the past year confirms the propositions formulated by Dr. Gross (loc. cit.) with respect to the surgery of the organ, and are generally accepted by operators. They are as follow :—

I. Lumbar nephrectomy is a safer operation than abdominal nephrectomy.

II. Primary extirpation of the kidney is indicated, (1) in sarcoma of adult subjects; (2) in benign neoplasms at any age; (3) in the early stage of tubercular disease; (4) in rupture of the ureter; (5) in ureteral fistula.

III. Nephrectomy should not be resorted to until after the

failure of other measures, (1) in subcutaneous lacerations of the kidney; (2) in protrusion of the kidney through a wound in the loin; (3) in recent wounds of the kidney or of the ureter, inflicted in the performance of ovariectomy, hysterectomy, or other operation; (4) in suppurative lesions; (5) in hydronephrosis and cysts; (6) in calculus of an otherwise healthy kidney; (7) in painful floating kidney.

IV. Nephrectomy is absolutely contra-indicated, (1) in sarcoma of children; (2) in carcinoma at any age unless, perhaps, the disease can be diagnosticated and removed at an early stage; (3) in the advanced period of tubercular disease.

HERNIA.

Under the influence of antiseptic surgery, the treatment of hernia has been greatly improved, resulting in the employment of laparotomy for the relief of diaphragmatic hernias, and of the direct method of operation in the umbilical, inguinal and femoral varieties.

Diaphragmatic Hernia.—Von Horoch describes a case of traumatic diaphragmatic hernia, the result of a stab wound immediately under the left scapula, the patient dying two days after, with symptoms of asphyxia. The autopsy revealed a wound of the left lung and of the diaphragm. Through the wound in the latter a portion of the stomach, also wounded, had escaped into the pleural cavity. Three cases of a similar nature are collated by von Horoch. With regard to treatment he suggests, in cases of diaphragmatic hernia with symptoms of strangulation, opening of the chest by rib resection, reduction of the hernia, and suture of the wound in the diaphragm in such a way that it should embrace the serous coat of the stomach. In hernia of the diaphragm, without chest wound, Senn advises abdominal section as a preferable method of reaching the seat of hernia, the frequent existence of pleuritic adhesions and the greater amount of traumatism, rendering the route through the chest cavity impracticable. In diaphragmatic hernia produced by penetrating wound of the chest, he approves of the method suggested by von Horoch, and in cases of accompanying injury to the abdominal viscera, he advises that abdominal section should be combined with it.

Umbilical Hernia.—Mr. Sidney Jones¹⁰⁷ reports two cases of umbilical hernia treated successfully by radical operation. In the

first case strangulation had occurred and the patient was five months pregnant. The sac was exposed, incised, and was found to contain a large mass of omentum partially adherent to the sac walls, with a loop of intestine, five inches long in the centre. The greater portion of the omentum was ligatured and cut away. The intestine was deeply congested, of a purplish color, but to all appearances healthy; it, with the omental stump, was returned to the abdominal cavity, the constriction having been released by an incision carried directly upwards from the umbilicus. The sac was dissected away from the skin, a ligature cast about its neck and it was removed. A large part of the integument, which had covered the hernia, was cut away, and the edges were approximated by alternate silk and catgut sutures. A drainage-tube was placed about three quarters the length of the incision, opening at the lower angle.

In the second case, reported by Mr. Jones, the sac contained omentum only, consisting of two portions,—one adherent and of long duration, the other more recent and much congested. The operation performed was similar to that in the first case. The method employed in these cases is attended with the best results, and consists briefly in excision of the omentum, ligature of the stump and reposition in the abdominal cavity; dissection of the sac, ligature of its neck, excision and return to the cavity of the abdomen; suture of the umbilical opening and, finally, suture of the remaining tissue of the wound, with the removal of redundant skin. Ligature of the sac renders the radical cure more certain, and prevents the escape of the wound fluids into the abdominal cavity during the process of healing.

At a meeting of the Philadelphia Academy of Surgery, Dr. Keen¹⁰⁸ read the report of a case of omphalectomy for strangulated umbilical hernia. The patient, aged 56 years, had suffered from umbilical hernia for 18 years, the protrusion occurring after the birth of her last child. Symptoms of strangulation appearing, the sac was incised, exposing a mass of healthy omentum surrounding and covering a small coil of intestine, slightly congested. The coil of intestine was easily reduced after breaking up the moderate adhesions which held it in the ring. It being found impossible to reduce the omental protrusion, owing to its firm adhesions to the mouth of the sac and the

depth and unyielding edges of the ring making it impossible to close it, omphalectomy was performed, removing by an elliptical incision six inches long, a section of tissue, in the centre of which was the umbilicus. The omentum, adherent to the ring, was now tied and divided. The wound was closed by four sets of sutures, one for the peritoneum, one for the muscular wall, one for the adipose tissue and one for the integument. The first three were of chromic catgut, the last of silver wire. Death ensued in about 36 hours.

Dr. Routier¹⁰⁰ reports a case of umbilical hernia in a woman aged 45 years, for the relief of which a radical operation was performed. The diagnosis of an epiplocele was made and on section of the sac this was verified. The omentum was detached from the sac, the neck ligatured and then resected, the stump being returned to the abdomen. Four silk ligatures were used to close the umbilical opening. The abdominal incision was sutured with horse-hair, and drainage provided for the deep and superficial portions of the wound. In two weeks cicatrization was complete.

Ventral Hernia.—Dr. Michael¹¹⁰ presented, at the meeting of the American Surgical Association, a report of a case of ventral hernia treated successfully by operation. The patient, a stout, robust woman, aged forty-five years, fell several years before, upon the handle of a washtub, striking the abdomen in the linea alba, midway between the umbilicus and pubes, and sustaining a subcutaneous rupture of the tissue of the linea alba, followed soon after by protrusion of the intestine. Various mechanical appliances were employed to prevent escape of the intestine but without avail, and operation was earnestly solicited by the patient. The opening was elliptical in shape, with the long axis vertical, about two and a half inches in length, with a firm and apparently cicatricial margin. The operation was performed by making a free incision exposing the sac, which was easily detached by the finger, down to its attachment at the opening. It was then emptied of its contents, opened and excised close to the margin of the ring. The opening was now closed by strong silver wire sutures, introduced three-quarters of an inch from the edge of the ring and about a half of an inch apart, including peritoneal, muscular and tendinous structures only. These sutures were twisted and the ends covered by perforated shot so as to provide a smooth rounded

surface. The skin and adipose tissues were closed by a continuous catgut suture, several pieces of coarse gut being placed beneath the line of suture for drainage. The wound was dressed antiseptically, and at the end of the second week the patient was discharged, cured. Seven months after the operation the cicatrix was examined and found firm and secure. The buried wire sutures could be felt lying deeply in the tissues and gave no trouble. Although this form of suture—the buried wire suture—has been employed in treatment of inguinal hernia, Dr. Michael believed that in the relief of ventral hernia he used it “without authority and without precedent.” A number of cases had been reported in which catgut sutures have been employed to close the ring in umbilical hernia.

Routier¹⁰⁹ reports a case of ventral hernia occurring in a porter, aged 52 years, cured by radical operation. The rupture followed a violent strain and was situated to the right of the linea alba and three fingers' breadth above the umbilicus. After many fruitless efforts to accomplish reduction, the sac was opened, exposing the omentum, which was tied, resected and the stump returned to the abdomen. The opening was sutured and also the abdominal incision. In sixteen days the patient was discharged.

Inguinal and Femoral Hernias.—Dr. Weir¹¹¹ read, at a meeting of the New York State Medical Society, an exhaustive paper on “the cure of reducible and irreducible hernias by Heaton's injection method and by radical operation.”

The author describes the procedure of Heaton, which until 1887 had been kept secret. It consists in injecting by a syringe, with a larger and longer point than in an ordinary hypodermic syringe, into the cellular tissue of the inguinal or femoral canal, after reduction of the rupture, from ten to twenty minims of a mixture composed of the fluid extract of white oak bark, thickened by the addition of fourteen grains of the solid extract of the same bark, and containing one half of a grain of morphia to allay pain. The object intended to be accomplished by this mixture is to block the hernial canal by inflammatory thickening of the parts and the organization of new connective tissue. In order to throw the injection into the inguinal canal, the position of the external ring is ascertained by carrying the index finger of the left hand perpendicularly into it, so as to feel distinctly the external edge of

the opening. The needle of the syringe is then introduced through the ring and pushed obliquely upward into the canal toward the internal ring, the mixture being injected as the needle is withdrawn by such a movement as will carry the point in various directions and bring the fluid in contact with the sides of the canal. On reaching the external ring it should be withdrawn suddenly so as to avoid depositing any of the injection in the subcutaneous tissues. A firm compress is then applied and the patient is kept in bed from seven to ten days, according to the amount of tenderness produced. After this period the parts may be protected by a light truss for two or three months. Subsequent injection should be made if the hernia reappears. If the injection has been successfully applied, a hard plug, about the size of the end of the finger, can be felt through the abdominal walls or by invaginating the scrotum, of sufficient size and firmness to block up the canal of a small hernia. Weir regards the procedure perfectly safe and most available in inguinal hernias of small size and of short duration, in which the canal is still oblique. In larger and older hernias the employment of the injection will so reduce the size of the canal as to permit better protection by a truss, and thus aid the individual in following his vocations. He has employed the method in 72 cases, of which 64 were inguinal hernias. Of the 8 remaining cases, 3 were femoral hernial, with 1 cure; 2 umbilical, both unsuccessful; 3 ventral hernias, all successful. Of the 64 inguinal hernias, the history of 35 of the patients was traced and it was found that in 12 a cure was obtained,—a percentage of 33. To the 35 cases of which the history is known, he adds 36 cases reported by Bull and Gay, with 9 cures (25 per cent.), which gives in the 71 cases with 21 cures the percentage of 29.5. In children in whom the long use of a truss had failed to relieve the hernia, a single injection, under the influence of ether, was sufficient to prevent permanently the descent of the hernia. Reference is made to the modification of Heaton's method by De Garmo, who states that he has treated successfully small hernias and those recurring after the radical open method of operation, by repeated injections of five to ten minims of Heaton's fluid without compelling the patient to go to bed and without interruption to his business. Of Schwalbe's method of alcohol injections the author could not speak from experience, quoting simply 34 cases reported

cured by that plan of treatment,—which consists in repeated injections of a 20 to 70 per cent. mixture of alcohol and water. In discussing the plan, Ranke stated that great pain followed its use in over 100 cases treated by him, and that it was of most service in children and in the small hernia of adults.

Passing to the consideration of reducible and irreducible hernias which cannot be treated successfully by injection methods, Weir discusses the various operative procedures which have within recent years been resorted to for their radical cure. The modern direct method of operation consists (1) in the exposure of the ring and upper part of the hernia sac by an incision from three to four inches in length; (2) reduction of the contents of the sac without opening it, if possible; (3) separation of the sac at its neck and application of a ligature about it at as high a point as possible after forcible traction has been employed. Incision and removal of the sac, except in congenital hernia, when a portion is to be left and closed by sutures, so as to form the top of the tunica vaginalis; (5) Suture of the ring and a portion of the canal. Drainage of the wound is provided for and it is then closed and antiseptically dressed. The various steps of the operation have been modified by different operators, from time to time, with a view, if possible, to accomplish more effective closure of the hernial canal and render the results more permanent. Weir directs attention to what he esteems an important point in the treatment of the contents of the sac,—the excision of the omental part of a hernia which by its abnormal length tends to produce relapses. Especially is this necessary in cases in which a mass of omentum has become irreducible by adhesion, or by long duration in the sac, or where inflammatory or nutritive changes have occurred.

According to Andaregg, excision of the omentum increases the risk of the operation by 2 per cent., owing to the occurrence of hæmorrhage in the stump. In 379 collected cases there were five deaths from hæmorrhage of this character. Proper precaution, however, in the application of ligatures will prevent this,—the mass being tied in sections and then finally surrounded with a turn of the ligature, silk being preferable to catgut as it does not so readily slip.

The plan of treatment of the sac by which, after isolation and ligation of its neck, the fundus has been excised, has been modified

in the following manner, which modifications have not included removal of the sac: (1) Obliteration of the serous surfaces by a row of sutures as practiced by Hahn. (2) Torsion of the sac and then ligation, with the employment of intercolumnar sutures transfixing it and thus preventing untwisting, as devised by Ball. (3) Macewen's method, which is thus described: "A stitch is firmly taken at the distal extremity and the end of the catgut suture is then passed in a proximal direction, several times through the sac, so that when pulled upon the sac becomes folded on itself like a curtain. The free end of this stitch, threaded in a hernial needle, is made to traverse the canal and to penetrate the anterior abdominal wall about an inch above the anterior ring, the wound in the skin being pulled upward so as to allow the point of the needle to project through the abdominal muscle without penetrating the skin. The suture is relieved from the extremity of the needle when the latter is withdrawn. The thread is pulled through the abdominal wall, and when traction is made upon it, the sac wrinkling upon itself, is thrown into a series of folds, its distal extremity being drawn farthest backward and upward. An assistant maintains traction upon the stitch until the introduction of the sutures into the inguinal canal, and when this is completed the end of the stitch is secured by introducing its free extremity several times through the superficial layers of the external oblique muscle. A pad of peritoneum is thus placed upon the abdominal side of the external opening. To accommodate this wrinkled up pad, the parietal peritoneum is previously stripped up for half an inch around the whole abdominal aspect of the circumference of the external ring."

The question of the closure of the ring or canal has claimed the attention of operators in their efforts to perfect the results obtained in the direct method of operation. Socin and others have declared that suture of the ring is of little or no avail in effecting a cure. The statement of Czerny, that while it was uncertain whether the treatment of the sac or of the ring and canal was important in securing successful results, and that it was better to use both procedures, has influenced largely the surgical practice in the employment of this step in the operation, in which not only the ring, but to some extent, the canal, has been sewn closely to the cord in the male and the round ligament in the female.

Macewen has, even in femoral hernia, in which it has been

thought best to avoid closure of the opening owing to the possible danger of implicating the femoral vein, sutured the falciform process to Gimbernat's ligament. In eight cases this method was employed with eight cures. Riessel has advised splitting of the inguinal canal in its whole length, excising a portion and suturing it from the internal ring downward, and publishes twelve cases thus treated, with one relapse. Silk, silver wire and catgut have been used in suturing the ring and canal. The latter, either in the form of heavy chromicized or aseptic gut is preferable, owing to the occurrence of fistulae after the use of silk and wire. Experience has shown that it is important to secure complete closure of the ring or canal, care being taken to leave the spermatic cord freely movable, lest descent of the hernia through the narrowed opening should occur and strangulation take place. The observations of Weir, in cases in which suppuration occurred after enucleation of the sac, thus leading to the formation of a cicatrix more or less extensive, induced him to leave the wound entirely open over the external ring, pack it with iodoform gauze and close it only by one or two sutures at the lower angle. The cicatrix thus formed afforded another barrier to the return of the rupture.

The after-treatment in operations for the radical cure is important, the patient being confined in bed until healing is completed, the dressings being carefully secured by bandages. At first the parts should be supported by a carefully applied compress, best composed of layers of adhesive plaster and bandages, and later by a light, flat, broad truss. Undue pressure by the truss must be avoided, as it is liable to cause stretching of the peritoneum and absorption of the newly organized tissues. In three or six months the use of a truss may be given up, if there is no evidence of a relapse. Heavy work should be cautiously undertaken,—not until four months have elapsed.

The frequent occurrences of relapses after the radical operation for hernia, perfect as it appears to be, has led to an expression of opinion by Ségond, which statistics apparently verify, viz., that "it is an operation which, in the majority of cases, only triumphs over an irreducible or unmanageable hernia and renders it controllable." In both strangulated and non-strangulated hernias, collated by Andaregg, 105 cases give 64 definite cures, or 61 per cent. Of 41 cases of relapse, 29 or 39 per cent. occurred in the

first year, 8 in the second year, and the rest at a later period. The relapses were slight and the hernias easily controlled by a truss. In 41 cases of non-incarcerated inguinal hernias, 21 or 52½ per cent. of relapses occurred, and in 6 cases of femoral hernias there was one relapse, or 16.6 per cent. In 33 strangulated inguinal hernias the percentage was 27, showing that a complete cure was more likely to follow the radical operation when done in these cases than in the non-strangulated variety. In ascertaining the rate of mortality after performance of the radical operation in free or non-strangulated hernias, the following summary of reported and collected cases is given: 379 cases with 16 deaths,—a mortality of 4.22 per cent. Deducting 5 deaths from hæmorrhage, a preventable cause under increased experience, the rate of mortality is reduced to 2.90 per cent. In 36 femoral hernias submitted to the radical operation, no deaths occurred. The collected cases of Andaregg show that the age of the patient, as well as the size of the hernia, influences the rate of mortality, since in 125 cases operated on between the ages of 11 and 40, only 2 died,—1.6 per cent. Under and over those ages the rate was 8.3 per cent. and 8.1 per cent. respectively.

The study of the subject leads Weir to the following conclusions: (1) That small reducible and easily controlled inguinal hernias can with safety be treated with Heaton's injection, and with a reasonable prospect of success. 30 per cent. of recoveries. (2) That in similar hernias in children, in which the use of a truss has failed, Heaton's injection is to be recommended as a particularly successful procedure. (3) That in unmanageable, painful or irreducible hernias, demanding surgical interference, and sometimes those in which Heaton has failed, the radical operation should be resorted to, with the sac tucked up or tied off, as the surgeon may determine, but with a high and complete suturing of the canal. (4) That where omentum is found in the hernia, it should be securely tied and resected. (5) That the wound in the region of the external ring should be healed by granulation to afford a cicatricial barrier as an additional factor in the case.

Strangulated Hernia.—In strangulated hernias, either of inguinal or femoral varieties, the radical operation should be performed at an early period, prolonged and violent efforts at taxis being scrupulously avoided. If the intestine is healthy, it should

be returned after division of the point of constriction. Omental protrusion should always be resected, the stump being carefully ligatured and returned to the abdomen. In cases in which long constriction has produced gangrene of the intestine, an artificial anus should be created and subsequently relieved by laparotomy and resection, or, if preferred, by division of the intestinal spur by the enterotome. Experience has shown that immediate resection of the gangrenous bowel does not give the favorable results obtained after creation of an artificial anus and subsequent resection.

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[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

DISEASES OF THE RECTUM AND ANUS.

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ANATOMY.

The disputed questions as to the existence and location of a third sphincter in the rectum and the arrangement of the so-called valves have induced Otis¹ to undertake some elaborate investigations on the cadaver with the aid of new instruments and appliances. The subject is placed in the knee-chest position, the anus is held open by retractors, and the illumination is obtained either by reflected light from a frontal mirror, or by a small electric light carried directly into the bowel.

Three precautions are used. The body is placed so that the abdominal organs are relieved as much as possible of all pressure anteriorly; the rectum is thoroughly emptied of fæces to allow of the entrance of air; and the bladder is emptied. In this position the rectum is in what may be called a state of natural distension, having both definite form and fixation; and its cavity is seen to be lined throughout with smooth mucous membrane, which no longer appears too large for its external coverings. Its general direction above the perineal curve corresponds with the curve of the sacrum and coccyx; but its internal surface is not that of an even cylindrical tube. It consists of large, saccular dilatations, marked off from each other by intervening partitions or folds, projecting alternately from left and right, one beyond the other.

These partitions or folds are semi-lunar in shape, involving rather more than one half of the circumference of the internal surface, and extending a little farther on the anterior than on the posterior wall. They consist in great part of a duplicature of the mucous membrane, projecting at the centre, where they are deepest, from 1-2.5 cm. into the lumen of the bowel. The number of visible folds of this kind was always two or three,—two of which were constant, the other variable. When two were present, the first was on the right side, about 6.5 cm. from the

margin of the anus; the second on the left, about 2.5 cm. higher. When three folds were visible, the first was on the left nearer the anus, varying from 4.5–6 cm. from its margin, being in some bodies well marked, in others scarcely perceptible. The other two folds were always well marked and practically the same as those just described, when two only were seen. The presence of three folds is more frequent than that of two. This saccular appearance is equally well seen in the lithotomy as in the knee-chest position.

The exterior of the rectum is also divided more or less regularly into segments by transverse sulci or semi-circular constrictions. These are confined to the sides of the rectum, and, as a rule, do not extend beyond the median line either in front or behind, where the longitudinal muscular fibres appear to be thicker. The number of these constrictions is not always the same, nor are they in all subjects equally well marked, but generally three or four are quite constant. One very noticeable constriction is always to be found on the right side marking the upper limit of the rectal pouch, extending from a point opposite the upper border of the triangular portion of the base of the bladder, just a little below the lowest point of the peritoneal pouch, behind the right seminal vesicle, backward to a point opposite the upper part of the coccyx. These ridges correspond to the folds on the interior of the bowel, and, with the mucous membrane covering them, form the sacculi already described.

The longitudinal muscular fibres of the rectum are not distributed in a uniform layer, but are collected into two groups, one in front, the other behind, with a thin layer of fibres between them. In the colon the longitudinal fibres are collected into three distinct bands; one of these, the posterior, is placed along the attached border of the intestine, and can be traced down the posterior surface of the rectum as a distinct band, spreading out laterally and increasing in strength in its lowest part. Tracing the other two bands, they are found to gradually converge in the lower portion of the intestine, sometimes coming together for a short distance in the sigmoid flexure; then separating, to again unite at the commencement of the rectum, and to pass down its anterior surface as one broad band, spreading out laterally and increasing in strength at its lowest part. On the sides, the longitudinal fibres form only a thin layer in the upper part, gradually thickening toward its

lower end. These two bands of muscular fibres, anterior and posterior, are shorter than the intervening parts; hence the sacculation; and the constrictions on the lateral aspects of the tube are the divisions between the sacculi.

The folds described within the bowel are composed of mucous membrane and bands of circular muscular fibre in greater or less proportions. The longitudinal fibres do not enter into the formation of the folds. Dr. Otis suggests that the longitudinal bands on the rectum be called "ligaments of the rectum," anterior and posterior, corresponding as they do with the ligaments of the colon.

Excepting that this description of the arrangement of the muscular fibres and folds of mucous membrane is more exact and definite than any previously given, the author's conclusions from his dissections are not different from those of other writers. The valves and folds have always been accepted, though their definite and constant location has not been. Regarding the so-called third sphincter, the author describes it simply as one of the thicker bundles of circular fibres on the lateral aspect of the bowel, without certainty of location or particular function beyond that of the other circular muscular bands,—in this also agreeing with other careful observers. It probably has no physiological function.

CONGENITAL MALFORMATIONS.

Jeannel² has made an elaborate study in connection with a case of imperforate anus of the pathogeny, diagnosis, and treatment of the different varieties of congenital malformations. The case was a peculiar one of absence of both rectum and anus, with intestino-vesical fistula. An unsuccessful attempt was made to reach the rectal pouch from the perineum, and was followed by inguinal colotomy by Verneuil's method. Instead of the intestine, the left ureter, malformed, and occupying the usual site of the sigmoid flexure, was opened. This was sutured and an artificial anus established, but the child died on the following day. A prolapsus of five cm. of intestine was noted at the artificial opening. After an exhaustive study, Jeannel concludes that some of these malformations are easy of diagnosis, and others very difficult, and often impossible. The former include all the malformations of the anus alone, the complete or partial persistence of the rectal pouch, and the simple contractions of the rectum caused by septa.

The latter include the cases of absence of the rectum, with or without malformation of the anus; imperforations, extensive atrophies, and double septa, with or without intermediate strictures, whether complicated or not by anal malformations.

For the diagnosis of the doubtful cases the study of the micturition will furnish signs of the greatest importance. If there be no anus, and the rectal pouch can neither be seen nor felt in the perineum, the deep urethra may also be absent. In this case the intestinal *cul-de-sac* exists in the lesser pelvis, is probably in communication with the bladder, and should be reached by the perineum. Imperforations and atrophies of the rectum are to be distinguished from its complete or partial absence by the constant coexistence of an intestino-urinary communication in the male, and a vulvar anus in the female. There is no absolute sign which enables one to judge at what height the terminal *cul-de-sac* of the intestine will be found. Fluctuation in the perineum if the anus is absent, and fluctuation at the bottom of the anal depression, if one exists, is but rarely observed, and then only when the rectum is obstructed or atrophied to a slight extent. Nearness of the tuberosities is often a sign of absence of the rectum. Exploration by bladder or vagina sometimes gives useful results; for if the vagina or bladder fill up the concavity of the sacrum, it is proof that the intestinal *cul-de-sac* is high up, and colotomy is indicated from the first. In absence of the rectum, if there exists a vesical communication, the intestine is high up, and colotomy is indicated; if, on the other hand, there exists a communication with the urethra, the intestine is low down, and should be searched for in the perineum. When there is a communication between intestine and bladder, there is also likely to coexist a malformation of the ureters and of the genital tract.

Finally, the diagnosis between intestino-vesical and recto-urethral communications is very difficult to establish, especially as surgical interference is always urgent, and the time to study the case correspondingly short. The old principles which distinguish hæmaturia from urethrorrhagia must be relied upon.

Trélat records a very interesting case of congenital stricture, first diagnosticated at the age of 52. and his remarks on the case are very instructive:—

The patient, a woman of vigorous constitution, free from all

important manifestations of disease, in whom the most careful questioning failed to reveal syphilis, was subject to growing constipation. The passages, extremely difficult, were at first accompanied by a few drops of blood, then by decided hemorrhage, and, after a time, by glairy mucus. Things had reached such a point that the pain and tenesmus, with the prolonged constipation, had affected the general health, and after a period of constipation lasting twenty-four days, followed by a violent breaking up, the patient decided to enter the hospital.

At the first examination it was easy to perceive the existence of a narrow contraction, five cm. above the anus, with some irregularity of the mucous membrane, but no ulceration. This was easily seen to be neither cancerous nor syphilitic, and after gradual dilatation, continued for some time, it was found to be a valvular contraction with a sound mucous membrane. Dilatation greatly relieved the patient.

In this case we find ourselves confronted with a peculiar kind of stricture which may be called not only simple, but congenital. It is a fact that congenital strictures occupy a more important position in comparison with those of organic origin than is generally appreciated. This valvular form is very characteristic, and no traumatism or tear is ever characterized by a simple diaphragm without any irregularities.

In his researches on this subject Trélat has observed one peculiar fact, which is that in the statements in the books on congenital stricture in children the cases are not followed out so that their ulterior results are known. In five cases observed by him he has been able to follow out the chain of accidents. In one with imperforate anus, which was simply divided, the patient only dragged out a miserable childhood by the most anxious care. At the age of 15, the case being neglected, there was established a most violent constipation, with severe occasional breaking up of the condition. In two other cases followed by autopsies there were observed congenital malformations, together with light and valvular stricture, so that by analogy he could easily admit that whenever in an adult he met a stricture presenting this formation it was congenital. These were characterized by their valvular form and by their location at about five cm. above the anus.

The symptoms which they cause are marked by various

epochs. With some they occur in infancy, in others only after thirty or forty years, so that it is difficult at first to understand how such a lesion can exist so long in a latent state. Possibly, however, the fact may be explained in the light that a great many affections of congenital origin do not manifest themselves till late in life,—for example, certain forms of tumors, and dermoid cysts in particular. On the other hand, in infancy and youth the tissues have no tendency toward contraction or induration, but, on the contrary, this is the period of suppleness and elasticity. The function of defecation is carried on at this time much more easily than at a later period. Thus it can easily be understood that slight contractions do not constitute a serious obstacle to that function for a long time; but that at a certain period of life the modification in the constitution of the tissues and functional intestinal troubles change the favorable conditions.

Congenital strictures are often accompanied by abscess and fistulæ at the lower end of the rectum; or they may end in time by setting up a proctitis, extensive adenitis, or deep pelvic phlegmons. In one case a peculiar hepatitis and interstitial nephritis were set up which caused death.

If physicians practiced rectal examination more frequently in cases of chronic constipation, more congenital strictures would be discovered.

At first gradual dilatation will effect a cure; but later it is not only less efficacious, but more likely to set up grave accidents, as proctitis, abscess, and peritonitis.

Dr. Vincent,³ in the surgical treatment of these cases, has made an improvement upon the operation of Amussat. He thinks that the failures in that procedure are due to perirectal infiltration by pus and fecal matter. When the bottom of the rectal pouch approaches to within three or five cm. of the anus (and these are the only cases suitable for this operation) a certain amount of traction is necessary to draw the rectum down to the skin and hold it there by sutures. After a few days the sutures relax, the rectum returns to its original position, and the subcutaneous and perirectal cellular tissue is left in free contact with the alvine evacuations, so that pelvic cellulitis is very likely to result. If, on the other hand, the patient lives, the perineal opening, deprived of its covering of mucous membrane, is obliterated after a

time, and is transformed into a rectal fistula, necessitating constant dilatation. Fæcal retention generally sets up peritonitis, which sooner or later causes death.

With the view of obviating these immediate and secondary dangers of Amussat's operation, Vincent has devised the following plan. An incision five cm. long is made in the natural site of the anus, its posterior extremity passing the tip of the coccyx about one cm. The rectal pouch is found and mobilized by the use of the finger and director, and the anterior face of the coccyx and sacrum is also exposed. By this plan no organ can be wounded, and the rectal pouch, which is recognized by its dark color, is more surely reached. When it is found and its adhesions are ruptured by the finger, it is brought down to the surface by gentle traction without being opened.

The next step is to determine the level of the insertion of the rectal pouch. If the bottom of the pouch comes to the skin without any traction, all is well; but if, on the contrary, it has to be dragged down to this level, the perineal incision must be prolonged past the coccyx and along the side of the sacrum until the rectal pouch rests easily on the level of the incision and remains there without traction. Two semi-lunar flaps of skin are then removed, causing an ovoidal loss of substance, with its long axis antero-posterior, with the object of preventing subsequent retraction of the anal orifice. The internal sphincter must be relied upon to prevent incontinence of fæces, and in none of Vincent's cases has this occurred.

The sutures are placed in two concentric planes. If the rectal pouch is intact, its lowest part should pass two or three cm. beyond the cutaneous wound, and should be fixed to the borders of the wound by catgut sutures. The pouch is then opened, and after the meconium has escaped, a constant flow of antiseptic fluid being maintained, the free edges are pared off, and the gut is attached to the skin of the margin of the wound by a row of fine silk sutures. If the pouch has been torn during the other steps of the operation, the first row of sutures is placed so that the knots are inside the new anus. The second row is passed the same as in the previous case, and in this manner all possibility of infiltration of the perirectal cellular tissue is overcome.

This procedure overcomes the tendency on the part of the

rectum to ascend when the sutures relax, the mucous border remains, and the ablation of the skin secures the permanence of the artificial anus. Another point gained by this operation is that if it be found to be impracticable after the cutaneous incision, the choice between inguinal and lumbar colotomy can better be made.

Dr. Vincent's deductions are based upon five successful cases.

Cripps⁴ in a recent discussion remarked that he had recently tabulated more than 100 cases of Littre's operation for imperforate anus. With regard to the statement recently made that there was only one case of recovery after this operation, he wished to state that this was entirely erroneous. In his own paper five recoveries were noted. He remarked that there were two chief varieties of imperforate bowel,—the one in which there was no sign of an anus, the skin stretching unbroken from the perineum to the coccyx; the other in which the anus existed, but terminated in a *cul-de-sac*. In the former the rectum was generally near the skin, and much more likely to be found than in the latter class of cases. By making the dissection well backward, and even, if necessary, following Verneuil's practice of resecting the coccyx, the bowel could generally be found and opened without opening the peritoneum. He considered the dragging down of the rectum and stitching it to the skin a mistake, for it hardly ever united, while the pus and the discharge became pent up behind the stitches, and then set up the peritonitis and cellulitis which were the chief causes of death.

Mr. Barling⁵ has shown a specimen taken from the body of an infant who died eight weeks after inguinal colotomy for imperforate anus. There was an anus with a slight *cul-de-sac*, and an unsuccessful attempt was made to reach the rectum from it. After colotomy the child suffered from recurring attacks of vomiting and diarrhœa, which finally caused death. The autopsy showed a large dilatation of the rectum at its lower extremity, it being entirely surrounded by peritoneum, and dilated to the size of an orange. It was suggested that the attacks of vomiting and diarrhœa were due to the retention of fæcal matter in the dilated pouch, and that the dilatation itself was due to the same cause.

Ball⁶ sums up the treatment of all these cases very concisely and satisfactorily. Accepting the usual classification (Papendorf, Bodenhamer, Mollière, Esmarch, Kelsey), his first variety includes

the congenital stenoses of the anus. The anus is either too narrow, incapable of dilatation, or obstructed by a membrane resembling the hymen. The treatment is the same as that for acquired stricture of the anus,—dilatation, or nicking, incision, and subsequent dilatation.

The second class comprises the complete occlusion of the anus by simple membrane or more fully formed skin, and the treatment is as simple as the diagnosis.

The third variety is the one presenting the greatest difficulties, there being no anus, and the rectum being partially deficient, and terminating in a *cul-de-sac* at a greater or less distance above its normal outlet.

The duty of the surgeon in these cases is clear. In the first place he should attempt to reach the rectal *cul-de-sac* by perineal incisions, and the sooner this is attempted after the diagnosis is made the better, as in all cases of intestinal obstruction delay means a fatal result. If we wait till the abdomen is distended with gas and the little patient is much run down, death will be the inevitable sequence. In selecting the form of operation it is of the greatest importance to determine the position of the rectal *cul-de-sac*. Unfortunately this is seldom possible with any degree of accuracy. If the pelvis be of normal shape, and the genital organs in the natural position; if on crying or straining there is a distinct protrusion in the anal region, then the probability that the pouch is within easy reach is strong. The protrusion may usually be excited by tickling the skin of the perineum; but the administration of purgatives for this purpose is wholly unjustifiable. It has been recommended by some surgeons to delay the operation for a day or two if the symptoms are not very urgent, in order to give an opportunity for the rectum to become more distended and prominent. Such advice is quite erroneous, as in the first place the meconium in the bowel becomes less by the absorption of fluid, and, what is more important, while we are waiting the time may slip away when alone a chance of success exists.

Before undertaking any operation, it is well for the surgeon to review in his own mind the anatomical points. The object in operating is to reach the bowel by direct incision from the perineum. Formerly it was the custom to use a trocar and cannula.

No doubt occasionally the bowel was opened, and exit given to a small quantity of meconium; but even when this result was obtained the opening was too small to serve as a permanent vent, while frequently fatal injuries were inflicted; the peritoneum, bladder, and common iliac vein having been opened by the instrument.

The patient being held in the lithotomy position, an incision should be carried from a little behind the root of the scrotum back to the tip of the coccyx, taking care to keep accurately in the median line. The pelvis should be explored by the finger from time to time during the progress of the operation, in order to try and feel the bulging of the rectal pouch, and the incision carried deeper at its posterior extremity than in front. If care be taken to keep the dissection well back in the hollow of the sacrum, the danger of wounding the genito-urinary organs is slight. The proximity of the rectum may sometimes be discovered by the dark color of the meconium showing through; but generally the finger is the best guide for detecting the gut. Having found and opened the intestine, and cleared it as far as may be necessary from its pelvic attachments to allow its coming to the surface, it should be stitched to the cutaneous margin of the wound; the stitches being passed deeply through the surrounding parts, so that no pockets can be left outside the rectum for the accumulation of pus,—the danger of periproctitis depending in great measure upon the care with which this is done. Drainage-tubes may be used if necessary in the deeper parts of the wound. Should difficulty be found either in reaching the rectum or bringing it to the surface, the coccyx, and even part of the sacrum, may be excised. Should the rectum not be found after careful search along the curve of the sacrum, there is nothing left but inguinal colotomy, unless it be found possible, with one finger in the abdomen, to force the rectum down to the perineal wound, fasten it there, and close the abdominal incision.

In the fourth variety, where the anus ends in a *cul-de-sac* and the rectum terminates at a variable distance above, the treatment is the same as in the last.

In the fifth variety the anus is completely absent or rudimentary, and the rectum terminates in a cutaneous opening at some other situation than the normal one. The prognosis in the cases in which the anus is pervious, but abnormally situated, is very

much better than in those in which complete occlusion exists. The abnormal anus may be sufficient for its purpose, and no operation be necessary. In any case a probe passed into the opening will indicate the position of the rectum. If this be found near the perineum it can be opened into from that point, brought down and stitched to the skin. When the pouch cannot be proved to be near the perineum, as is often the case where the abnormal anus is at a considerable distance from the usual site, no attempt should be made to reach the bowel from the perineum, but if necessary the abnormal outlet must be dilated. In some cases where two fistulous outlets exist, they may with advantage be converted into a single canal.

In the sixth variety the anus is absent or rudimentary, and the rectum terminates in some of the mucous passages of the genito-urinary system. Forty per cent. of all cases are of this variety. In atresia ani vesicalis the diagnosis is made from the fact that the meconium is intimately mixed with the urine, staining it of a greenish color, and only appears during urination. In atresia ani urethralis, although the first urine that is passed may be stained, the subsequent flow is quite clear.

When the opening is into the bladder, there is little or no chance of reaching the bowel through the perineum, and the only proper treatment is laparo-colotomy, with complete closure of the lower end of the bowel. When the opening is into the urethra, the chance for a perineal operation is much better, and it should always be attempted. When the opening is into the vagina, many plans of treatment have been devised; but the best is that of Rizzoli, consisting in an incision from the lower margin of the vaginal anus, through the perineum, backward toward the coccyx, care being taken not to open into the rectum. The termination of the rectum, with its vaginal orifice, is now to be dissected out with great care, and the abnormal anus transplanted to the perineum, while the vagina and perineum are repaired by deep sutures. In this way the anus which nature has formed, with whatever sphincteric power it may possess, is preserved.

Ball⁷ has placed on record the following unique case of malformation,—one of atresia ani, in which a diverticulum from the rectum passes forward and becomes related to the urethra without opening into it:—

The patient, a medical man, after suffering for some days from intermittent fever, developed an inflammatory swelling at the root of the penis and deep in the scrotum. He had suffered from some pain while the bowels were being moved. An incision into the swelling opened up a gangrenous and foetid abscess, apparently in connection with the left crus penis. Passing a finger into the rectum, a membranous stricture just within the anus was found, through which the finger readily passed, and above which could be detected a diverticulum of the rectum passing in the direction of the abscess. The anus and stricture were forcibly dilated. Subsequently fecal matter in small quantity passed from the wound at the root of the penis. The patient had been born imperforate and operated upon. He subsequently recovered, and the diverticulum seems to have been closed by the inflammatory action.

ABSCESS AND FISTULA.

Trelat^s again calls attention to the rules which he long ago formulated for the treatment of abscesses at the margin of the anus. The first is, whenever an abscess at the margin of the anus presents itself, which you are about to open, or which is about to open spontaneously, it should be explored with a probe to discover how high the burrowing extends, and the rectal wall should be divided to the full height of the burrowing. The second is, when one is dealing with a fistula in ano, he should commence by a very careful examination of its disposition, its depth, and diverticula, in order to open all tracks, bring to light all sinuses, and change all the old surfaces for natural cicatrization. These rules are based on the belief that it is only under the most exceptional conditions that an abscess of any size at the verge of the anus fails to perforate the mucous membrane of the bowel, even after free external incision. This is the old plan of treatment recommended by Faget in 1743, and is also insisted upon by Reclus, Bazy, Horteloup, Berger, and Terrier, in spite of occasional successes which attend a free external opening with proper drainage and dressings.

The treatment of fistulae without a cutting operation is receiving a fair trial, and many new plans have been devised, attended by a greater or lesser degree of success. Andrews has investigated the so-called "Brinkerhoff System" of quackery, and explained

the injection of hamamelis and persulphate of iron (which, when mixed, by the way, form a very good black ink). He recommends keeping the external opening free and injecting the whole track of the fistula with strong hydrogen-peroxide. After this every three or five days he injects a solution of bichloride of mercury 1-3000. Matthews uses Otis' urethrotome, all along the track, after having dilated it with laminaria. There is no doubt that simple fistulæ with comparatively straight tracks may be cured by this general plan of treatment. The secret of success consists in keeping the external opening dilated, and in setting up a healthy granulating process all along the track by irritating injections.

The treatment by complete excision of the pyogenic membrane and the immediate closure of the resulting wound, under antiseptic dressings, has also had a more thorough trial. Lange,¹³ Quénu,¹⁴ and others have reported new cases. Out of nine operations Quénu obtained primary union in six. The method is especially adapted to simple forms of the disease without large purulent cavities or diverging pouches.

Edwards¹⁵ says he is constantly reminded of the fact that the average practitioner does not take sufficient pains when operating for fistula to lay open all the sinuses. The one most often left is that which extends from the internal opening upward under the mucous membrane. In speaking thus he does not refer to the cases of extensive disease where the whole ano-gluteal region is filled with sinuses, for here judgment must be used as to how much cutting the patient will bear. In these cases it is better to lay open the main track with one complete division of the sphincter, and trust to injection of the branch sinuses with some stimulating fluid.

Another common error in operating is not keeping to the fistulous track, but, owing to impatience or insufficient delicacy in manipulating, the point of the director is thrust through the sinus-wall, and is then free to roam in the cellular tissue of the part. In this way a portion of the main track may be left while large, unnecessary incisions are made. Such an accident may always be avoided by taking plenty of time in the operation, and by carefully sponging the part of the sinus already laid open.

With regard to sinuses extending above the internal opening, the treatment depends entirely upon the position of the sinus in

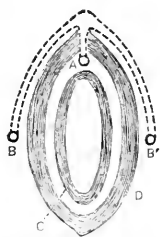
relation to the muscular coat. If it be sub-mucous there can be no reason why it should not be freely laid open; but if it extends outside the muscular layer it is better left alone, especially if its division involves also that of the internal sphincter. When this or any other sinus has been left, he recommends the injection of tincture of iodine every other day.

The most frequent form of fistula which is overlooked is the blind internal, and this happens daily both in hospital and private practice. The simplest way of detecting them is to feel for the induration, which always accompanies the disease.

Mr. Goodsall has pointed out that there seems to be a definite relation between the external and internal orifices of a fistula; for fistulae having their external orifice behind a plane passing transversely through the centre of the anus usually have their internal orifice in the middle line posteriorly, and therefore have a somewhat curved course; whereas those which are anterior to this supposed plane generally have their internal openings directly opposite the external and on the same side, thus forming the simplest kind of direct fistula. These simple fistulae frequently run over and not under the external sphincter, so that in laying them open there is no division of the muscle. The recognition of this relationship between the two orifices is often of assistance in discovering the internal one.

He lays great stress upon the necessity of being provided with proper probe-pointed steel directors of various shapes. Silver ones are too flexible, and most of the steel ones in the market are useless on account of the thickness of the point.

The horse-shoe fistula is represented in the cut. It is a term given to a fistula having one or more external openings (*b*) on either side of the anus, and an internal one (*a*) in the middle line behind. The outer openings may be equidistant from the anus, and situated quite anterior to it, or they may be at different distances, and placed wide from the anal orifice far out on the buttock. The abscess which causes this form of fistula is situated at the lower and back part of the bowel, and instead of breaking through the skin immediately over it (being confined by the fibrous raphé extending from the coccyx to the anus, and

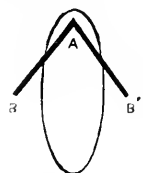


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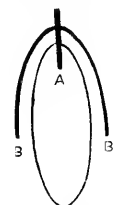
also by the insertion of the levator and the superjacent sphincter), it turns to either side, escapes from under the sphincter, and then breaks through the sub-cutaneous tissue and skin. The usual plan in operating on such a case would be to slit up both tracks, one after the other, thus dividing the sphincters twice, and running great risks of subsequent incontinence. But this form of disease can be cured by a single division of the muscle, and that at right angles to its fibres. First pass a probe-pointed director through the internal aperture, and on its point incise the skin in the middle line behind; then push the director through, and slit up. Second, slit up the lateral sinuses on directors passed in at the external openings, and brought out at the dorsal incision. These lateral sinuses may take a straight, curved, or even rectangular course, as shown in the cut, with the proper incision in each case.

The first incision will divide the sphincter, but the others will only divide the tissue external to it. Should the external openings be so placed that a straight line drawn from one to the other will pass behind the anus, the steps of the operation should be reversed, and a director passed in at one aperture and out of the other, and the tissue divided. Then

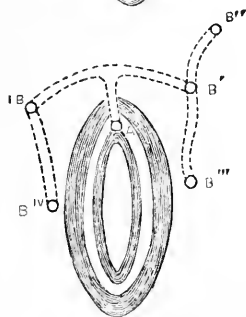
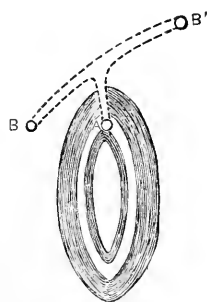
the director is passed from the wound into the bowel through the internal opening, and the sphincter cut. The credit of this



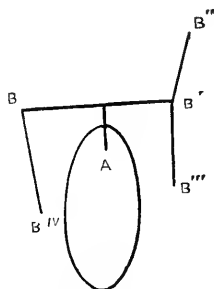
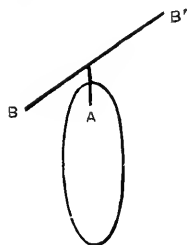
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operation is due to Mr. Goodsall, and has not previously been described.

The following case of fistula completely encircling the bowel is unique: On examination an abscess was found on the left side externally, and another, only to be felt by the finger in the gut, was situated dorsally and communicated with the gut. The one on the left side was opened. Ten days later, when the parts had become quiet, ether was given and a thorough examination made with this result: A complete fistula on the left side toward the perineum; a dorsal abscess cavity communicating with the bowel in two places; and from these two internal openings a sinus running round on each side of the bowel under the mucous membrane, parallel to and on a level with the sphincter, terminating in the track of the complete fistula first mentioned. This was, then, a fistula running completely round the bowel, having three internal openings and one external one.

The operation performed was as follows: First, the complete fistula on the left side was laid open, which did not necessitate entire division of the sphincter. Second, a free incision was made dorsally, laying open the abscess cavity, and including both internal orifices. Finding now that the probe passed round the bowel on either side from one incision to the other, the author hesitated to lay them both open, but contented himself with the division of the lower or left one. This incision was on a level with the muco-cutaneous junction. Had the corresponding sinus on the opposite side also been divided, the mucous membrane of the gut would have been completely severed from that of the anus. There was considerable hemorrhage, necessitating the use of the vulcanite tube, and packing with lint, and the undivided sinus never caused any trouble.

Hæmorrhoids.—The treatment of hæmorrhoids by excision, after the plan described and practiced by Whitehead,¹⁶ is coming into more general use. He was led by his own experience to abandon both the ligature and the clamp and cautery; and his advocacy of the operation of excision is founded on three hundred cases without a single instance of secondary hemorrhage, or one case where any complication such as ulceration, abscess, stricture, or incontinence has occurred. Every patient has been completely cured, and that without causing him any anxiety.

Whitehead does not consider that any surgeon has a thorough conception of hæmorrhoids until he has performed excision. He may have dissected the cadaver any number of times, with the special object of studying their structure; but it is only on the living subject that dissection will reveal their real nature. In surgical literature hæmorrhoids are described as distinct, individual tumors; but vivisection demonstrates that the entire plexus of veins surrounding the immediate interior of the gut is always at fault. Without doubt the hæmorrhoidal condition is marked by special protuberances at certain points in the circumference of the gut; but these have a pretty uniform disposition, owing no doubt to the regular arrangement of the fibrous septa.

The essential fact is that, though possibly concealed by these masses, there are minute, venous radicals behind and between the main tumors. They are now as small as their larger neighbors once were; but let the latter be removed by ligature or clamp, and these apparently insignificant veinules will dilate and take their place, the very removal perhaps affording room for growth, and, while taking off external pressure, leaving tension within increased. The permanency of the cure and the welfare of the patient depend on the removal of these rudimentary piles, and he believes that excision alone accomplishes this object.

The operation is described as follows:—

1. Anæsthesia and the lithotomy position.
2. Thorough dilatation of sphincter.
3. By the use of scissors and the dissecting forceps the mucous membrane is divided at its junction with the skin round the entire circumference of the bowel, every irregularity of the skin being carefully followed.
4. The external and the commencement of the internal sphincters are then exposed by rapid dissection, and the mucous membrane and attached hæmorrhoids, thus separated from the sub-mucous bed on which they rested, are pulled bodily down, any undivided points of resistance being snipped across and the hæmorrhoids brought below the margin of the skin.
5. The mucous membrane above the hæmorrhoids is now divided transversely in successive stages, and the free margin of the severed membrane above is attached as soon as divided to the free margin of the skin below by a suitable number of sutures.

The complete ring of pile-bearing mucous membrane is thus removed. Bleeding vessels throughout the operation are twisted on division.

It will be observed that beyond the chloroformist no skilled assistance is necessary, a single nurse being quite sufficient. It is better to commence the separation of the mucous membrane at the lowest point and deal with the two sides in succession before completing the circle above, so that any oozing may be below the work as it proceeds. The incision must be made through the mucous membrane, and not through the skin. It is very important that no skin be sacrificed, however redundant it may appear to be, as the little tags of superfluous skin soon contract, and eventually cause no further inconvenience. If this precaution be taken there is no fear of stricture.

The attachment of the mucous membrane and piles to the sphincters is so slight that he employs only closed scissors or his fingers to separate them. The firmest adhesions are always found at the highest and lowest points, where the fibres of the external sphincter converge. With a little patience the whole of the hæmorrhoidal plexus can be isolated and the membrane drawn down, leaving the external sphincter almost bare and clearly dissected. Up to this stage of the operation there is practically no hemorrhage, for the arteries run immediately beneath the mucous lining, and not in the loose tissue separating it from the sphincters. They are, however, necessarily cut in the next slip, which consists in the transverse division of the mucous membrane above the piles. To prevent hemorrhage it is advisable to cut through the bowel by degrees, and to twist each bleeding vessel as divided. After securing the vessels, before any further incision across the bowel, it is better to attach the free edge of the mucous membrane already divided to the corresponding portion of the verge of the anus. By this means the author almost always secures healing by first intention. Before closing the wound iodoform is insufflated. Carbolized silk is used for suturing, and the stitches are allowed to find their own way out.

It will readily be seen that the substitution of this elaborate operation for the much simpler ones of the ligature or the clamp is based solely upon the supposed inefficiency of the latter in preventing the return of the disease.

Whitehead does not say in so many words how many times he has known of a return of hæmorrhoids after these operations, but in the experience of most men such a result is very uncommon. If it should be a fact that either of the simpler operations were not to be trusted in this particular, the profession would very gladly adopt the new one, tedious as its performance may be.

Lange¹⁷ has modified this procedure somewhat. He gives more careful attention to antiseptics, and after the mucous membrane has been dissected up he passes a number of concealed sutures of iodoform-gut from the base of the skin flap to the base of the flap of mucous membrane, to hold it down into view and control the bleeding after he divides it across.

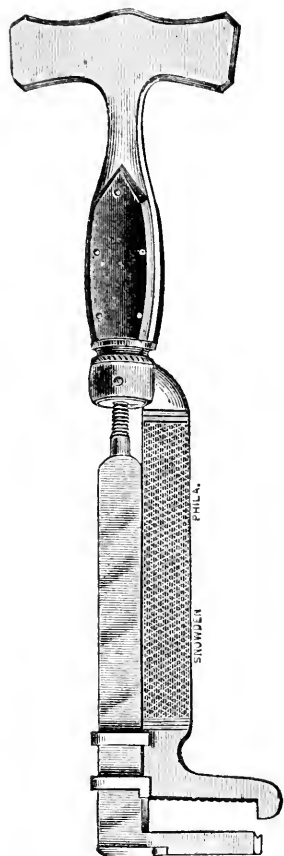
The treatment by injections of carbolic acid has had many trials, and a considerable amount of literature has been added to the subject,—some of it favorable to the method and some the reverse. Sonnenberg¹⁸ and Lange¹⁹ have each declared themselves in its favor, and seem to have had no serious accidents. A more careful statement of experiments with different strengths and the results comes from Haynes,²⁰ and his experience has been by no means entirely satisfactory, though he has cured some of his cases with more or less trouble, and has had no serious complications. Kelsey²¹ goes over the whole subject, and records in detail some bad accidents which have followed this treatment. These may be enumerated as follows: pain, ulceration, abscess, deep or superficial, and hemorrhage; together with the impossibility of giving any definite prognosis as to the length of time necessary for cure or the permanency of the cure. He believes it to be a recognized mode of surgical treatment worthy of due consideration, but adapted only to certain cases of moderate disease well above the sphincter, and even in these cases very uncertain in its effects, and by no means devoid of danger. Among the other plans of treatment reviewed in this monograph are the ligature, and the clamp and cautery, the latter being the favorite with the writer.

Mr. C. J. Smith²² presents to the profession a new and improved clamp for the operation of crushing, which he thinks has advantages over those of Benham and Allingham, and which is shown in the figure on the next page.

Verneuil²³ and, after him, Trélat²⁴ continue to advocate the treatment by forcible dilatation. The former gives 98 per cent.

of cures by this simple operation. He makes no distinction in the cases; both external and internal, old and recent, large and small, and apparently those associated with a relaxed sphincter, as well as those with the opposite condition, are treated in the same way.

The point chiefly insisted upon is that the dilatation should be thorough, and should include the internal as well as the external



SMITH'S CLAMP.—(*British Med. Journal.*)

sphincter. The cure is said to be effected in the following way: In a certain number of cases the hæmorrhoids disappear and never return. They are at first slightly inflamed, and afterwards gradually atrophy. The complete cure in these cases requires from two to three weeks, the first two or three days being attended by pretty severe pain.

In another class of cases there is no pain, but the cure takes a longer time. After dilatation the piles disappear, only to return when the patient walks about. Cold douches and lotions are then employed. The tumors recur slowly and progressively, and under these circumstances the cure requires from five to six weeks. In a third group he places what he calls the exceptional cases,—those complicated with prolapsus or paralysis of the external sphincter. In these the sphincter is first further paralyzed and then treated by electricity.

Trélat adopts the proceeding and precepts of Verneuil except in the “exceptional cases.” In these he uses the cautery, holding that a sphincter which is paralyzed

is not greatly improved by further paralyzing.

Mr. Fred. A. A. Smith²⁵ has introduced a combination scissors and clamp for hæmorrhoids and other small tumors which answers a good purpose. It both clamps and cuts simultaneously, and the clamp is firmly closed before the scissors begin to cut. It is manufactured by Maw, Son, and Thompson, Aldersgate Street, London.

PROLAPSUS.

Gorski reports²⁶ that Mikulicz operates upon old and extensive cases of prolapse that cannot be cured by milder measures in the following way: After disinfection of the parts, he makes under continuous irrigation an oblique incision 3 cm. long just below the anus, through the entire thickness of the outer portion of the intestine, and secures the cut edge of peritoneum to the peritoneum covering the inner portion with Lambert's sutures. In this manner the entire prolapsed portion is encircled and then removed by cutting through the inner portion just below the sutures. The edges of mucous membrane are then united by interrupted silk sutures, and the stump returned above the sphincter. Good results are said to have been obtained by Mikulicz, Billroth, and Nicoladoni.

Lange²⁷ also reports an ingenious and less serious operation for the same condition. The patient had been operated upon by the usual methods several times, but without effecting a cure; the anal ring was relaxed, and the bowel protruded several inches on the slightest pressure. The patient was fixed on the table in the knee-elbow position, and an incision made from the lower part of the sacrum down to the anus until the posterior wall of the rectum was reached. The coccyx was then removed for two reasons,—to narrow the gut as high up as possible, and to allow the proposed action of the levator ani to be less impeded. The lumen of the rectum was narrowed in such a way that buried *étage* sutures of iodoform catgut were introduced, which did not perforate the entire thickness of the gut; the first row being inserted near the middle line and forming a fold in the posterior wall, which protruded into the rectum. In this way the more lateral portions of the gut, so far as it could be done without causing too much tension, were brought into apposition. Then the surfaces of the levator ani and external sphincter, which had been dissected back in order to lay bare the posterior wall of the rectum, and next their cut surfaces, were united by similar sutures. In order to secure a more lasting union, several buried sutures of silkworm-gut were also inserted into this muscular crest. Finally a few more sutures were introduced in the integument, and the cavity left by the removal of the coccyx loosely packed with iodoform-gauze. Except at this part

union occurred by first intention throughout the entire wound; the patient's control over his bowels began to be manifest after the first few weeks, and the prolapse never recurred.

Cripps²⁸ reports an obscure case of prolapse of the upper into the lower part of the rectum (intussusception) without protrusion of the intussuscepted portion from the anus, upon which he operated by the cauterizing method of Van Buren. He prefers the old cauterizing irons, bent at a right angle, with button-shaped point, heated in the flame of a spirit-lamp.

Cazelas²⁹ reports a case of spontaneous rupture of the rectum in an old case of prolapsus,—in other words, a case of prolapsus containing a pouch of peritoneum, which peritoneum contained loops of small intestine, and on being ruptured allowed the escape of the intestines through the rent in the rectum.³⁰

This was a woman, 70 years old, who had suffered for a long time from prolapsus. In an effort at defecation there supervened a sharp pain, hemorrhage, a rupture of the prolapse, and an issue of more than a metre of small intestine. Quénu (whose classical monograph on this subject is worth reading by all) was called upon to operate, and found the loop of intestine already gangrenous. He first resected the gangrenous portion, then did laparotomy, and attached the two cut extremities to the wound, establishing an artificial anus. The patient only lived a few hours. On autopsy the rent was found in the anterior wall of the rectum, larger on the peritoneal than the mucous surface, the rectal walls being healthy except that the veins were slightly varicose.

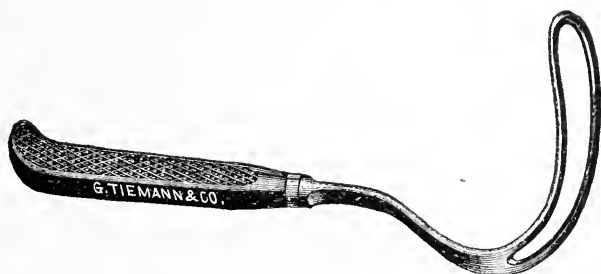
Ulceration.—Kelsey³¹ has called attention to some of the simpler forms of ulceration,—those which are neither tubercular, syphilitic, or lupoid,—and has given several cases illustrating the difficulties attending their diagnosis and treatment. He calls attention to the frequency with which a small ulcer in the rectum is indicative of a fistula of the blind internal variety, and to the impossibility of cure in such cases till the concealed track is laid open. The retractor employed in rectal examinations and operations when the patient is anesthetized is shown in the figure on the opposite page.

The general rules of treatment are briefly summarized as follow:—

Any exciting cause, as fistula, or deep tracks, constipation,

uterine displacement, excessive purgation, etc., must be removed. The patient must be carefully dieted and kept quiet. The local treatment consists in stimulating, caustic, or sedative applications, according to the nature of each case. Complete destructive cauterization is never necessary in the simple form of the disease. When the ulceration affects the lower part of the gut so as to be subject to the direct action of the sphincter, rest and relief of pain are best secured by free division of that muscle through the site of the ulcer.

Lupoid Ulcer.—Duret³² calls attention to the differential diagnosis of lupoid ulceration, and to a case treated by him by complete excision. The patient for three years had submitted to all sorts of general and local treatment for an old and extensive ulcer. He was 45 years old, otherwise in good health, with no constitutional



KELSEY'S RECTAL RETRACTOR.—(*Medical Standard*.)

taint, and no history or sign of syphilis, though he had been submitted to anti-syphilitic treatment. Cauterization and the thermo-cautery had also been employed to the ulcer. The peculiar point in the location of the sore was that it was combined with a condition of prolapsus, and was located on the posterior internal surface of the prolapsed bowel, so that it was extruded from the anus by straining down the prolapsus. It began at the muco-cutaneous junction, and extended upward from 6 to 7 cm. The bottom of the ulcer was grayish-white, studded with rosy granulations of irregular form, and disposed along the bundles of circular fibres. The sore ended sharply, and gave place to mucous membrane marked by a sharp, festooned border, and sufficiently reddened to distinguish it from perfectly healthy membrane. The ulceration was not excavated, but extended slowly and progressively. It was removed by

V-shaped incision through the whole rectal wall and substance of the sphincter, and the edges of the wound brought together by deep and superficial sutures. The patient made a good recovery. The tissue removed showed under the microscope the large follicles characteristic of lupus, both in the ulcer and the surrounding mucous membrane.

Tubercular Ulceration.—Dr. Kolischer³³ recently made an interesting communication on the treatment of localized tuberculosis by means of parenchymatous injections of solutions of the biphosphate of lime. He wished to produce calcification of the fungous masses by supplying the tubercular foci with a sufficient quantity of the salts of lime; and also to produce an irritation of the tubercular granulations, and thus give origin to a cicatricial destruction of the nodules. Following this plan, he obtained healing of the fungous masses in an interval of from four to six weeks. He brought forward some cases at a meeting of the Imperial Royal Society of Physicians of Vienna to show the striking and rapid improvement obtained by the procedure. He showed two cases of fungous granulations of the elbow-joint in which recovery had followed the use of the injections for six weeks. These patients had formerly suffered from ankylosis and extensive swelling of the elbow-joints, with severe pain and fever. At the time of the demonstration the joints were quite normal and perfectly mobile. He also showed a calcified caries of the hand in an adult, a cured fungosity of the tibio-tarsal-joint, and a case of fungous granulation of the knee in which severe symptoms such as ankylosis and swelling had been present before the treatment, and which had been successfully treated in five weeks. The formula is

Calc. phosphor. neutr.	5.0
Aq. distill.	50.0

Add phosphoric acid sufficient for perfect solution, filter and add acid phosphor. dil. 0.6. Aq. distil. q. s. ad 100.0.

Wounds and Foreign Bodies.—To add to the literature of these examples of what the French politely call “aberrations of the sexual sense,” Champy³⁴ gives an egg-cup and a tobacco-pouch, which were not carried into the rectum by accident.

The accidents include a case of wound with a piece of corduroy trousers carried through the rectum into the peritoneum³⁵ and resulting fatally; a piece of bamboo cane carried into the rectum

by a fall, and subsequently removed with good result;³⁶ and a case of chicken-bone causing a fistula in ano, relieved by operation.³⁷

Cancer.—Lange³⁸ and Mollière³⁹ each add one case to the list of melanotic cancers of the rectum. Mollière, in his work on the rectum published some years ago, only found five examples of this form of disease. Kelsey⁴⁰ publishes five more, and these two now reported together with one by Ball,⁴¹ bring the number to thirteen. It has never been seen in any other portion of the canal except the rectum, and though rare in man is common in the horse (Virchow, quoted by Ball).

Treatment.—Kraske⁴² reports eight cases of cancer treated by his operation, which consists in resecting the diseased part through an opening made at the left side of the sacrum. The operation is only applicable to a certain class of cases,—those in which the disease is too high to be exsected by the operation in the perineum and too low to be reached by laparotomy; and these cases are by no means rare. According to his method the soft parts are divided in the median line from the second sacral vertebra to the anus; the muscular attachments to the sacrum are divided as far as the edge of the bone on the left side; the coccyx is removed; the attachments of the two sacro-sciatic ligaments to the sacrum are cut, and the soft parts drawn to the left side. If still more room is necessary, it may be gained by removing a part of the lower left side of the sacrum. If the bone be divided on a line beginning on the left edge at the level of the third posterior sacral foramen, and running in a curve, concave to the left, through the lower border of the third posterior sacral foramen, and through the fourth to the left lower corner of the sacrum, the more important nerves are not injured and the sacral canal is not opened. In this way the whole upper part of the rectum as far as the sigmoid flexure may be resected. This plan also allows of an actual resection of the disease and a union of the upper and lower divided ends, with preservation of the normal anus.

Hochenegg⁴³ also reports a successful case of this operation, and argues in favor of it.

Alexander⁴⁴ experimented on the cadaver with Kraske's incision, without knowing that it had previously been tried, and abandoned the plan on account of the difficulty of the dissection. His own plan consists in the exsection of the coccyx and all of

the sacrum necessary, up to a certain limit, and is thus described:—

The patient is placed in the lithotomy position. With proper antiseptics, the rectum is plugged with cotton-wool, to an extent entirely preventing the escape of fæces. The knife is placed on the tip of the coccyx, and an incision, penetrating well into the subcutaneous tissues, is made from that point forward, till it reaches a convenient distance from the anus, whence the knife should sweep completely round the anus till it meets the wound already made. Only one or two points on each side will require ligatures; the others may be compressed.

The incision is next extended along the middle line of the sacrum and coccyx till the level of the healthy bowel is reached, or until the level of exit of the fourth sacral nerve is closely approached. This extension of the incision should go well down to the bone. The sacrum and coccyx are now to be cleared, both posteriorly and laterally, from all their connections, the point of the knife closely hugging the bone during this stage of the operation. No vessels of any importance are likely to be wounded, but the rectum itself may be cut as it lies in front of the bones. With the finger the rectum may now be cleared from the bone and held out of the way, while the bones are detached with forceps or chain-saw. The healthy rectum should now come into view, or be capable of being pulled down behind into view, and should be stitched in position by a suture passing through the serous coat and the skin on each side. Healthy rectum should, if possible, protrude beyond the skin to allow of free evacuation of the fæces well beyond the wound, the mucous membrane of the bowel being everted by the sutures that join it to the skin.

After fixing the healthy rectum by a stitch in this way, the anus should next be freed from its surroundings. The attachments of the levator and other muscles are to be cut through close to the rectum, and all bleeding points compressed as soon as they appear. The larger ones should be twisted or ligatured, and the smaller cease to trouble after a short compression. Laterally and posteriorly, it is necessary to keep as near the rectum as the diseased structures allow. This and the prompt stoppage of bleeding are the only things necessary at this stage. Anteriorly the membranous urethra comes into view, and is easily cleared. At the

anterior boundary of the prostate, firm resistance is encountered, and an appearance that may be mistaken for peritoneum. A bougie passed per urethram will be useful as a guide. The membrane just described should be divided horizontally for half an inch, and just beyond the wall of the bowel, as shown by the catheter. The prostate now appears, and the finger inserted into the opening thus made can strip the rectum from the prostate and neck of the bladder all along the median line. Lateral attachments still remain to be cautiously divided with the scissors till the vesiculæ seminales, the vas deferens, and ureters are seen. The peritoneum is now seen, and, if care be used, can be stripped off the rectum, till the healthy gut is reached above the disease. Six inches can be removed in the cadaver without injuring the peritoneum.

The extensive wound is to be kept scrupulously clean by frequent irrigation. Hitherto it has not been contaminated by faeces, nor should it be now. The gut is to be held in position posteriorly, and the anterior portion of the wound closed. To allow the sides of the wound to dip into the excavated perineum, deep sutures of strong silkworm-gut should be passed through the margins of the wound from side to side, at intervals of a quarter of an inch up to the margin of the retracted rectum, the last one passing through the serous coat of the healthy bowel. Then, all bleeding points being stopped, the limbs are extended, and the body turned well on either side. The sides of the wound now fall in and fill up the hollow, leaving a fold between like the nates. This hollow is packed full of iodoform gauze, through which three small drainage-tubes discharge, after the silkworm sutures have been tied. The end of the rectum is now stitched laterally by three silkworm sutures, and the diseased part cut off. Then the whole thickness of the coat of the rectum is sutured firmly to the skin around by numerous fine silkworm sutures, care being taken to allow no faeces to enter the wound, and to stitch it so closely as to seal the wound for several days at least against the entrance of faeces. Iodoform is dusted over the gauze, and the dressing completed with cotton-wool. The faeces and discharges are allowed to pass away from and around the rectum. The cotton-wool over the gauze is to be changed two or three times daily. Alexander describes two cases, in one of which he failed

to get union by first intention, by the patient getting out of bed into the night-chair on the fifth day. He, however, made a good recovery. The other patient was aged sixty-one, and also did well.

It will be seen that this operation is not the same as Kraske's, and is a return to a line of work which antedates the latter. Kraske's incision permits the removal of the disease up to the sigmoid flexure, and also allows the preservation of the anus when not diseased. Alexander's operation is the old one of excision of the anus and rectum, modified to reach as much rectum as possible.

With regard to wounding the peritoneum in excision, Eve⁴⁵ reports a case in which six inches of gut were removed and the peritoneum divided in consequence all around, the whole being done with the *écraseur*, and the patient making a good recovery. Cripps, in remarking on the case, said that probably one in five of the twenty-five cases he had operated upon had been complicated with an opening into the peritoneum, and there had been no fatal case. When the disease had advanced so far as to involve the peritoneum it usually returned within a year.

Manifestly the rule enunciated by more conservative men, that cancer of the rectum should not be extirpated except when the disease is within reach of the finger and movable on surrounding tissues, is being very widely departed from. These extensive operations show what can be done, but can hardly yet be said to have proved their advisability. Koenig and Senn⁴⁶ raise warning voices, and the great mass of the profession are in a waiting mood. Certain it is that the mind of the American patient does not take kindly to them.

Durante⁴⁷ advises a preparatory inguinal colotomy in cases of extirpation of cancer as a preventive measure to avoid infiltration and periproctitis.

Dermoid Cyst.—Biernaeki⁴⁸ reports a rare case from Gusserow's wards. A retro-rectal tumor was diagnosed, and during labor its nature was made evident by tapping, whereby nearly a pint and a half of hair and greasy material escaped. Despite the consequent diminution in bulk of the growth, it still remained such an impediment to labor that perforation was necessary. Convalescence was retarded by suppuration of the cyst. Notwithstand-

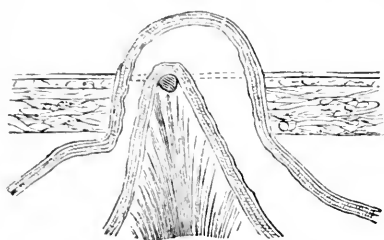
ing free incisions, pus with faecal odor burrowed beyond the limits of the growth under the right labium majus, the nates, and the vagina. After two months the patient was discharged, cured. Biernaeki has found records of four other similar cases.

Formation of Artificial Anus—Inguinal Colotomy.—It may be said that the formation of an artificial anus in the left groin is decidedly growing in favor over the old operation in the loin. Every reason points to this as the favorite site, now that the old fear of opening the peritoneum has been removed. Many authors are now advocating it who formerly preferred the loin operation, and the statistics of the one operation are as good as the other. In fact, no mass of statistics regarding either operation is of any value, so greatly do the cases in which it is performed vary. There is certainly no reason why, in equally well-selected cases, the peritoneal operation should be more fatal than the old one, nor is it so, while for ease of operation and subsequent comfort of the patient it has every advantage.

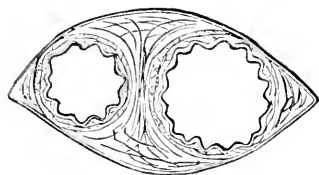
Many improvements have been made in the technique. Allingham, Jun.,⁴⁹ points out several after expressing himself decidedly in favor of this over lumbar colotomy. He makes an incision two inches in length, about one inch inside the anterior superior spine of the ilium, and parallel with Poupart's ligament. On reaching the peritoneum a small incision is made into it, and a hold retained upon the cut edges with clip forceps. Scissors are then used to cut through it till the wound equals that in the skin. A flat sponge is then introduced to keep the intestine out of the way, and to keep any blood from entering the abdomen, while the cut edges of peritoneum are carefully stitched by interrupted sutures of fine carbolized silk to the cutaneous margin of the wound. By this maneuver rapid healing is obtained, and the chance of the escape of discharge from the muscular wound into the peritoneum is greatly diminished. The sponge being removed, a search is next made for the sigmoid flexure. In some cases it will bulge into the wound, and can be recognized by the longitudinal bands and appendices epiploicæ. In others, however, the small intestine or great omentum will present. Should the large intestine not present, pass the index finger into the abdomen, and slide it over the iliacus muscle until it is reached and hooked up. Should this fail, search toward the sacrum till the rectum is

found and traced upward, or search upward for the descending colon and trace it downward. The large intestine has a much firmer feel than the small, and the ridges formed by the longitudinal muscular bands easily distinguish it.

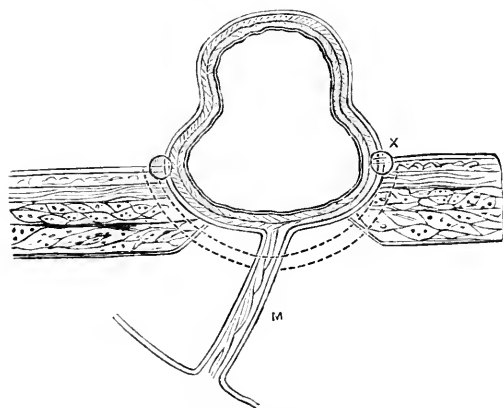
When the gut has been recognized, it should be passed through the fingers till a portion with a good mesentery is found.



(Brit. Med. Jour.)



(Brit. Med. Jour.)



(Brit. Med. Jour.)

Of course this can only be done when the disease is in the rectum or lower sigmoid flexure. Generally the part of the sigmoid first pulled up has quite sufficient mesentery. If the gut is fixed to the back of the abdomen by a short mesentery, it should be pulled up as far as possible and stitched to the wound so that the intestine when opened some days later looks like the orifice of a double-barrelled gun.

This appearance is obtained by introducing the sutures thus: a needle threaded with carbolized silk is passed through the mesentery close to the intestine on both sides, as represented in the figure, then through the abdominal wall on both sides, *nearer the lower than the upper angle of the wound*, and these are tied up tight. If there is little or no sigmoid meso-colon, the suture may be passed through the serous and

muscular coats of the gut at its posterior part. Leaving a piece of loose gut outside the wound, it is next sewed all around to the skin, passing the thread only through the muscular and serous coats. This is done very carefully so as not to prick the mucous membrane. Antiseptic dressings are then applied, pads being

placed over the opening, so that if there is vomiting the gut may not break away from the sutures. If there be no bad symptoms (vomiting, great distension, colic) the gut is not opened for two or three days, but should symptoms demand it the opening may be made in twelve hours.

When the dressings are removed, the exposed intestine is found firmly fixed by lymph to the abdominal wall,—in fact, completely covered with it.

To open the gut scissors are used, cutting the intestine from above downward to the extent of about an inch and a half. Through the incision can be seen two orifices separated by a well-formed spur, the upper opening being the larger, the lower the smaller; for in speaking of the sutures through the mesentery it was noted that they were to be passed nearer the lower than the upper angle of the wound, for the reason that the lower opening is only required to clear out the rectum or allow any retained faecal matter or discharge to come up; whereas the upper orifice must be kept patent and large for the new anus.

There is generally a large quantity of gut on both sides of the incision. This is removed by cutting it away until its edge is nearly on a level with the skin. If this is not done there is too great a prominence; for though the walls shrink to a certain extent, the shrinkage is not enough.

The bleeding is trifling, and the vessels, if clipped for about five minutes, cease bleeding. No pain is experienced in cutting the tissue of the gut. It is important to fasten the gut well outside the wound, for only by so doing can a good spur be obtained; and if the spur fails the operation itself is a partial failure, and the patient is still constantly troubled with the passage of faeces below the artificial anus, irritating the growth and causing pain.

If the details pointed out are attended to, and special care be taken in passing the needle not to perforate the mucous coat, there is hardly any danger of peritonitis.

This writer states plainly his reasons for preferring the inguinal to the lumbar operation.

The position for operation is undoubtedly better, both for patient and surgeon; for if the abdomen is distended the side position is bad for the administration of the anaesthetic. In the side position the intestine tends to fall away from the loin, and

this is sure to happen if there is a well-marked mesentery, thus increasing the difficulty in finding the gut, and necessitating a larger incision, the introduction of the hand into the wound, and therefore considerable disturbance of the cellular tissue about the loin.

The idea that the sigmoid flexure, being more movable, is more difficult to find than the colon may be dismissed, because in the inguinal operation the peritoneum is opened and the incision (one inch internal to the anterior superior spine) is over a comparatively fixed point of the gut,—the junction of the descending colon and the sigmoid flexure. Even when the rectum is on the right side this point remains about the same. Through this incision the following points can be felt: the last two ribs, the crest of the ilium, and the lower part of the kidney; downward, the first part of the rectum; toward the median line, the last three lumbar vertebræ and the aorta. The sigmoid flexure is more easily found in this position than the colon in the loin.

It is rather instructive to see this writer freely confess (what every operator knows) that the colon often cannot be found in the loin without opening the peritoneum, passing the hand into the abdomen, and searching for it; but what becomes of the advantages of the supposed extra-peritoneal operation under these circumstances?

A point worthy of notice is that only four inches of gut intervene between the artificial anus when made in the loin and the one which can be made in the groin if it is desirable in the latter operation to keep as far away from the rectum as possible. The sigmoid flexure is seldom implicated in cancer of the rectum, however, and the opening in the loin always gives plenty of room to avoid the disease. Another point in favor of this operation is that the incision, being less deep and extensive, involves less risk of subsequent suppuration of the deep muscular planes and cellular tissue.

The author considers the lumbar operation the safer in those cases in which, on account of great distension, an immediate opening of the gut is indicated; for what reason he does not say, but probably because there may be less danger of the gut being detached from the wound.

In discussing the advisability of establishing an artificial

anus in cases of cancer where excision is inapplicable, Cripps⁵⁰ says a patient on whom he operated a year before was not only alive, but wonderfully improved and, notwithstanding that the local growth had made some advance, her general health and strength were far better than one year ago. She was no longer troubled with diarrhœa, but had one good motion daily through the artificial anus, and had been able to attend as usual during the year to her domestic duties. The artificial anus readily admitted the forefinger, and the mucous membrane was exactly on a level with the skin. There was no sign of cicatricial tissue around the orifice, which was perfectly soft and dilatable. The patient knew when she was going to have an evacuation, and had the power of controlling it, there being no involuntary escape. In fact, the patient herself said she had no more trouble with the artificial anus than when the opening was in the natural position.

After carefully watching a large number of cases of rectal cancer, in some of which colotomy has been performed, while in others nature has been allowed to take its course, he does not hesitate to pronounce strongly in favor of the operation. The relief of the symptoms is very marked, the constant diarrhœa and tenesmus, which so frequently form such a distressing complication, being entirely relieved. The downward course of the patient is certainly made much easier, and the miserable termination of life by obstruction or perforation prevented.

Moreover (and this is a very important point) he feels confident that the progress of the growth is retarded in consequence of the bowels acquiring physiological rest by the cessation of its function. That the rapidity of malignant growth depends much on the activity and consequent blood-supply of the organ affected admits of no doubt, and as an example may be instanced the relative rapidity with which cancer grows in the breast of a pregnant or suckling woman.

So that, apart from life being indirectly prolonged by the relief which colotomy affords to distressing symptoms, he feels confident that the growth itself is often retarded and rendered comparatively quiescent when the rectum is placed at rest by the operation.

The practical question that arises is as to what period in the course of a case of rectal cancer colotomy should be performed.

In answering this question he is completely in accord with Mr. Reeves, who advocates the performance of the operation as soon as symptoms of stricture become prominent. The troublesome diarrhoea, pain, tenesmus, and blood-stained discharge owe their origin far more to the retention of scybala above the contracted part than to the disease itself. To wait until the unfortunate sufferer is at death's door, worn out by the constant discharge or by the actual occurrence of obstruction, is not only to have deprived him of the benefit of the operation, but to perform it at a time when it becomes a dangerous procedure. The operation, if performed before the patient is much reduced in strength, has but little risk. In his own practice he has as yet had no death as an immediate result of the operation when performed for malignant disease.

Lumbar Colotomy.—Cripps⁵¹ describes a very favorable case of lumbar operation in which the patient had complete control over the passages one year after the operation. He purposely divided the various layers between the skin and lumbar fascia, not on the same level, but the opening in the fascia was considerably above that in the skin, so that the bowel when drawn out ran obliquely for a short distance between the fascia and the skin. He thinks it essential, if the patient is to derive full benefit from the operation, that care should be taken to prevent the opening from contracting. It is of great importance, with this view, to get union of the bowel with the skin by first intention. If this occurs, there is little or no tendency to contract. On the other hand, if the bowel falls away from the skin the granulating tissue with which the interval is occupied is nearly sure to contract on healing. In one case in which he recently operated, half the benefit was lost from this cause; for on seeing the patient two months after the operation the opening would barely admit the finger. Any tendency to contraction is best overcome by allowing the wound to heal over a good-sized plug. He regards it a great advantage to make the opening through the abdominal walls as valvular as possible; and this is best done by making the incision through the skin considerably lower than that through the fascia. If the opening is made in this way and care is taken during the healing process to prevent contraction, the patient will have little or no difficulty in managing the artificial anus.

Trélat⁵² gives his unhesitating adherence to the lumbar operation. In the eleven operations of his own he has had two accidents. Once he opened the small intestine, and the other time there was an anomaly,—a loop of small intestine being fixed to the posterior wall of the abdomen and superposed upon the descending colon. Both patients died shortly after the operation.

Allingham's operation is essentially the same as Verneuil's,⁵³ except that he uses a ligature through the mesocolon to draw the gut to the surface, while Verneuil employs two large pins and resects two-thirds of the wall of the bowel protruding from the wound. Both worked to obtain a well-marked spur of the posterior wall of the gut which shall close the lower opening.

Duménil⁵⁴ also adopts this procedure, and reports a case illustrating its performance and its advantages.

Kœnig⁵⁵ does Verneuil's operation in the groin, but empties and closes the lower end before attaching the upper to the wound.

Reclus,⁵⁶ in recounting a very interesting case of inguinal colotomy for obstruction due to paralysis of the gut, gives the following alternatives for operating:—

1. The cancer is small, movable, circumscribed, and attached to the sigmoid flexure. In these very rare cases an incision may be made after the manner of Littré, the tumor may be drawn outside, excised, and the two ends of intestine fixed back to back in the abdominal wound, with the hope of subsequently establishing the natural course.

2. The cancer is small, movable, circumscribed, and attached to the upper extremity of the rectum. An incision should then be made in the median line, the cancer removed, the lower end of the gut carefully obliterated, and the upper end fixed to the angle of the wound.

3. The cancer is large, diffused, and adherent, and is situated in a part of the rectum which cannot well be reached by an abdominal incision. Then, if extirpation by the anus is impossible, do the operation in the left groin. Cases advocating the same groin operation are reported by Jeannel⁵⁷ and by Trélat.⁵⁸ Glasser⁵⁹ reports the autopsy on a case in which an artificial anus had been made twenty years before. The sigmoid flexure and rectum below the artificial anus were contracted to a cord the size of the little finger, with a central lumen lined with smooth walls. The mucous mem-

brane was wanting, and against the artificial anus as well as at the other end a thin septum had developed.

Closure of Artificial Anus.—Angerer⁶⁰ has reported a case in which he closed an artificial anus seven months after it was made because of its nearness to the stomach. The gut was completely resected. The patient made a perfect recovery.

Hertzberg⁶¹ prefers the enterotome (the mortality being 4 per cent. as against 27 per cent. by resection), and reports a successful case in which the anus was due to a gangrenous hernia.

Cancer of Prostate.—Fenwick⁶² records some interesting cases of cancer of the prostate, of the soft and rapidly extending form, with protrusion into and obstruction of the rectum, in which he has done colotomy with great advantage. These cases have a very rapid growth, and when they once ulcerate on the rectal surface rapidly destroy life by the bleeding, which is due in great measure to the action of the bowels. In these cases it is the rectal surface which suffers, and not the vesical, and the patient, while dying of intestinal obstruction, may have scarcely a vesical symptom.

The gain from colotomy is very great. In the first place the danger of rectal hemorrhage is avoided,—a hemorrhage which must be increased during the act of straining, when the growth is seized between the grip of the levatoris ani below and the abdominal pressure acting from above. Secondly, a probable source of septic infection arising from the introduction of liquid faecal matter into cavities of a very vascular growth is avoided. Thirdly, the patient is relieved of the pain and distress which a partly occluded bowel must of necessity produce. Lastly, the growth of the tumor is retarded by avoiding the straining, which necessarily crowds it with blood. By colotomy the rectum and its tumor are placed in a condition of comparative rest, and thus is withdrawn from it that intermittent but appreciable increase in its blood-supply.

STRICTURE.

Electrolysis.—Whitmore⁶³ has treated incipient as well as old-standing cases of stricture by electrolysis with the best of results. In one case he dilated the rectum from 18 French urethral to 9 rectal bougie in three months, and no contraction had taken place for a month following the treatment. In another case, which it had taken two years to dilate from No. 2 to 4 rectal bougie, and

which was in a most critical condition from inflammatory symptoms, he had increased the size from 4 to 7 in three months, no contraction happening in this case also during the months following.

On the other hand, Whitehead, of Denver, Col.,⁶⁴ records his own early experience. The treatment extended over one month, and included four applications, each lasting about half an hour. The first was made with a Curt-Mayer (platinum-zinc) battery. The cathode made for the purpose was introduced partially into the stricture, and there was rapid dilatation of the lower part of the stricture only. At the second *séance* a week later the box of Remak's battery, containing Siemens' elements, was substituted for the Curt-Mayer battery. Dr. Neftel began with two elements and gradually increased to fifteen; at which the current was maintained for five minutes, with a deflection of the needle of the galvanoscope of fifteen degrees. The current was then gradually increased to twenty-one elements, by adding one element at a time, and maintained there for five minutes. It was then interrupted and the upper part of the stricture found to be considerably dilated. The applications were several times renewed. At the third and fourth applications about twenty of Siemens' elements were used, and considerable frothy mucus, due to the development of hydrogen gas, escaped from the anus. Some months afterward the stricture was quite as tight as before the treatment.

Cooper⁶⁵ contributes a chapter from Stephenson on electricity in rectal diseases, in which its use is strongly recommended as a means of enlarging strictures. It is used, however, as a powerful cautery, destroying tissue and producing sloughs, and not at all upon the theory in vogue in New York that it will dissolve a stricture by gentle use without causing any pain or any disorganization of tissue. The whole question of electricity in rectal and urethral surgery may fairly be considered as still *sub judice*. That it will destroy a stricture everybody knows, if it be used in sufficient force; but that it will accomplish anything in a painless current of from two to five millicampères on a stricture of the rectum remains to be proved. On this subject the writer hopes to be able to contribute something definite in the near future.

Kelsey⁶⁶ reports a rare case of double stricture of the rectum and sigmoid flexure, due to old pelvic cellulitis and subsequent

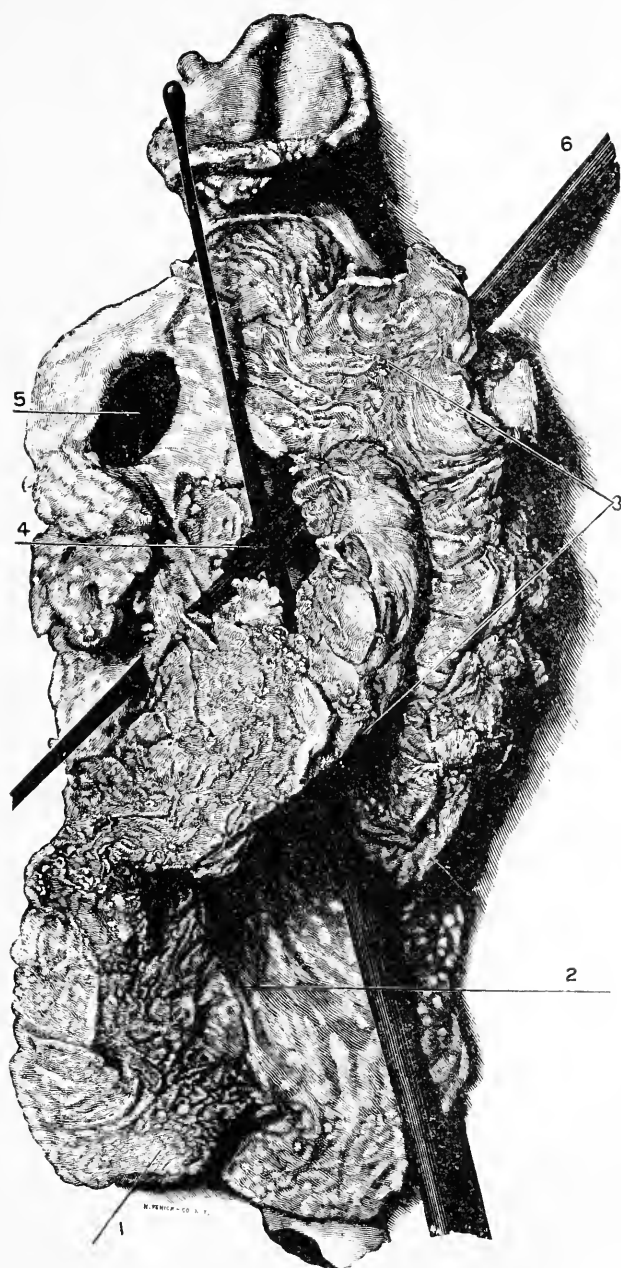
contraction, which illustrates the mode of treatment to be followed in intestinal obstruction, both acute and chronic, when colotomy is declined.

The patient was a widow, fifty years of age, who was first seen in December, 1884. She described an attack of pelvic peritonitis four years before, which had nearly cost her her life, and to which she correctly ascribed all her subsequent trouble. She had never been free from pelvic and rectal pain since the attack, and had experienced a steadily increasing trouble in defecation ever since. About July, 1882, bloody passages and the usual diarrhoea due to stricture began, and it had never ceased. The patient was anæmic, emaciated, and in bad general condition, besides suffering from chronic intestinal obstruction.

An examination revealed a mass of cartilaginous firmness connected with the uterus behind, and completely blocking the rectum by pressure against the sacrum. The finger entered the bowel two inches, and beyond this point nothing could be passed larger than a hard-rubber male catheter. It was impossible to tell what length of the rectum was occluded by the mass, except as the sensation of wall like resistance led one to suppose that the disease must be of considerable extent, and filling nearly the entire pelvis.

The patient was under constant observation until her death.—a few weeks less than two years from her first visit; and, colotomy being declined from the first, the time was passed in a prolonged struggle to prevent as long as possible her death from intestinal occlusion. Dilatation with bougies at first worked very favorably. Commencing with a large-sized catheter, in a few weeks a stomach-tube could be passed, and at the end of four months a No. 8 flexible rectal bougie. Beyond this point the rectum was absolutely undilatable,—and the expression is used literally; for again and again the end of the index-finger was introduced into the stricture, and yet, with the exercise of all possible strength, no more impression could be made than upon a piece of wood. Another fact which became almost certain as frequent passages of the bougie were made was that we had to deal with a second obstruction a short distance above the first; for though a No. 8 bougie often passed through the first contraction, it never went on up the bowel more than an inch or so.

The patient was much troubled with discharges of blood and



1. Anus. 2. Rectum. 3. Stricture laid open. 4. Abscess cavity communicating with rectum by perforations above and below stricture, as shown by the probes. 5. A small ovarian cyst.—(*New York Med. Journal.*)

matter, and as there was no ulceration of the rectum below the obstruction it was supposed there must be above, as is so generally the case. In this the writer was mistaken, as the specimen will show.

For about eighteen months there was little or no change in the patient's condition; but at the end of that time the urine became albuminous, and she rapidly lost strength, though the rectum still remained pervious to the bougie, which was passed at least once a week, and generally twice.

A few months later she was found suffering from complete obstruction of seven days' duration. On account of her feeble condition and the heart and kidney complications the use of the bougie had been omitted, with this result. The obstruction was attended by all the usual signs,—great distension and visible coils of intestine, much rumbling of gas, and vomiting, with the pulse at 120.

This condition was struggled with from August 25th to September 7th. The treatment was at first by opium and tapping, but the opium was badly borne, the respirations rapidly falling to seven with small doses, and showing a decided tendency not to come up again. After a day or two of this the treatment was changed to gentle laxatives, and after a few trials on successive days a No. 8 bougie was again passed through the first obstruction, where it became plugged with feces, and up to the second, but more than six inches of the tube could not be introduced without more force than it was safe to use; and water injected through the bougie when at this distance was immediately expelled. From August 25th to August 31st very little had been accomplished by treatment, except that she had been fairly nourished with enemata of peptonized milk, and the great distension had been somewhat controlled by frequent tapplings, which gave escape to large quantities of gas. She was, however, in much the same condition as when the treatment began,—pulse 120, urine in fair quantity and albuminous, vomiting, and occasional passages of a drachm or so of bloody mucus.

On August 31st it was decided that the only chance of success lay in full doses of opium, in spite of their not being well borne, and the treatment by this means alone was begun a second time. Morphine was used in doses of one-sixth of a grain, and in a very

few hours the patient was in a condition which is seldom seen. The respirations were five to the minute, and remained so, except when the patient was aroused, for two days and nights. Except when roused she lay in a perfectly tranquil sleep, breathing occasionally with a deep, sighing respiration, followed by one or two lighter ones, and never going over five to the minute. She was, however, easily roused when spoken to (the only thing which gave courage to continue the drug), and at such times the respirations came up to fifteen and twenty to immediately fall again when left undisturbed. She was of course constantly watched, and, considering that we were dealing with uræmia as well as obstruction, the morphine was continued, not according to the frequency of respiration, but guided solely by the ease with which she could be aroused. The doses of morphine, it should be said, were not at all large for such circumstances. No record of the actual amount was kept, but it was a decided feature of the case that a respiration of five should be maintained with the amounts administered.

At the end of twenty-four hours of this treatment the patient had two large, solid evacuations, the first in fourteen days. The morphine was steadily continued for a week longer, with occasional tappings, when she had three more copious passages, the distension disappeared, and the obstruction was relieved. This was on September 7th. On September 28th she died with uræmic convulsions, the bowels having been very loose, but somewhat distended with gas, up to death.

Autopsy Six Hours after Death.—Kidneys small and contracted. Other abdominal and thoracic organs healthy. Moderate distension of large intestine with gas, but no fecal matter. The point of greatest distension during life, and the one at which the tapping had always been done, was found to be the transverse colon, misplaced so as to run vertically on the right side parallel with the ascending colon.

Pelvic contents matted together and firmly adherent to the sacrum and coccyx, from which they were removed with great difficulty and in one mass, shown in the specimen.

The anterior surface of the uterus and the bladder were free from any exudation, but both ovaries and broad ligaments, the rectum, and Douglas' pouch, were solidly imbedded, and all cemented firmly to the sacrum and coccyx. Both ovaries were

cystic. In the space between the uterus and rectum there was an abscess cavity filled with black, sloughy tissue, the existence of which had not been suspected during life. This at some time had opened into the bowel both above and below the stricture, and accounted for the discharges of blood and pus of which the patient complained. The walls of the abscess were thin, and were ruptured by slight pressure during the removal of the specimen.

About an inch and a half above the first stricture there was a second, caused by a distinct band, which had twisted the bowel on itself and bound it firmly down to the top of the sacrum. Here there was no mass of exudation around the gut, and any undue force with a bougie would certainly have resulted in perforation.

The points of interest in the case are briefly these:—

1. The effects which may result from plastic exudation in the pelvis.

2. The unsuspected presence of an abscess.

3. The absence of any changes of an ulcerative character in the bowel, either above or below the stricture.

4. The possibility of preventing intestinal obstruction for so long a time with the parts in such a condition.

5. The effects of the morphine treatment in relieving the obstruction which finally occurred.

6. The fact that, although an eminently proper subject for colotomy, the patient was kept alive for two years from the first obstruction without it, and that death was finally due not to obstruction, but to the kidneys.

Gangrenous Cellulitis.—The following rare case is reported by Moore.⁶⁷ A German mason, age 47, stood astride a wall for several hours, handing brick to other masons who were working on it. Soon after he began to suffer pain in the prostatic region and retention of urine, the latter lasting twenty-four hours and necessitating catheterism. Redness and swelling of the perineum followed and this was freely incised, giving vent to foul pus. Gangrene of the tissues quickly supervened and the patient entered hospital. His pulse was weak and rapid, temperature somewhat elevated; penis, scrotum, perineum, buttocks, and tissues over the pubes red, very œdematous, and painful to touch. An opening left by a slough from the perineum on the right side led into a large

cavity by the side of the rectum, and extended up to the pubic bone. No communication could be discovered between this and the rectum. No. 28 French catheter passed to the bladder without meeting the slightest obstruction, and a considerable quantity of natural urine was withdrawn. Extensive incisions were made into the œdematous tissues, allowing the escape of a large quantity of thin, bad-smelling fluid having some of the characteristics of decomposed urine. This fact at the time obscured the diagnosis of the origin of the trouble, especially as no evidence of urethral stricture was obtainable. The deeper soft parts were already darkened from gangrene. Thorough irrigation, drainage-tubes, and antiseptics were used, and the patient was catheterized often enough to prevent any possible urinary infiltration. The gangrenous process was not checked, however, and spread up the abdominal walls, while large sloughs came away from perineum and scrotum. Death occurred three weeks after the possible cause of the trouble (the position astride the wall) and five days after entering hospital. On autopsy, water injected into meatus passed freely into the bladder, and after the urethral orifice was closed, pressure on the bladder failed to force it out, showing the urinary tract to be intact. There was no perforation discoverable.

Polypus.—Lucas-Championnière⁶⁸ reports a rare case of recurrent polypus. The patient, a man of twenty-six, had carried since two years old a rectal polypus which had steadily but slowly increased in size, until at the time of examination it presented the size and appearance of a placenta at term. The tumor was smooth and lubricated with mucus.

Extirpation was made by a quadruple ligature, and microscopic examination proved it to be an adenoma. Ten months afterward it returned with more appearance of malignancy, and the patient died of cachexia.

FIBRO-MOLLUSCUM OF THE ANUS.

Reclus⁶⁹ insists upon his name, fibro-molluscum, for the masses of fleshy tumors so often seen at the verge of the anus due to any source of irritation, and more particularly to any irritation attended by discharge, which are ordinarily called condylomata, warts, external hæmorrhoids, etc., and are often, and very erroneously, supposed to be a sign of syphilis. He insists upon the term

in preference to all others, because of the identity in structure between these growths and fibro-molluscum on other parts of the body. The disease at the ano-rectal region presents the same appearance of small, rounded tumors composed of skin, connective tissue, and striated fibres.

The matter is simply one of name, the condition itself being perfectly familiar to all observers.

Veneral Diseases.—Kelsey⁷⁰ has given an exhaustive study of the venereal diseases of the rectum and anus in all their varieties, remarking, as a preface, that the subject has never yet been mastered, either by the syphilographer or the student of diseases of the rectum; the difficulty with the syphilographer in general being that he is not familiar with rectal exploration, and with the rectal specialist that he is not an authority on venereal diseases. Many manifestations of syphilis escape the former merely from being outside of the usual field of his examinations, and many are brought to the notice of the latter not because they are venereal, but because they produce pain and trouble in the rectum. The field is one in which every observer's clinical experience is of the greatest value, for many of the points still *sub judice* may easily be decided by a few carefully studied cases.

The term venereal disease is used in its broadest sense as including all affections referable to or directly caused by the sexual act; and the number of such is very considerable, for there is scarcely any manifestation of venereal disease capable of affecting the soft tissues which has not at some time been observed in the rectum or anus.

As to their different modes of acquirement, some are purely local, some are manifestations of constitutional poison. The former may be acquired by accidental contact or by the practice of unnatural sexual vice. However disgusting this last phase in the etiology of venereal disease may be, it cannot be set aside as a matter of ancient history, nor disregarded in the practice of medicine of the present day.

For statistics regarding the extent of these unnatural practices we are in great measure dependent upon French and German writers on legal medicine. All through French medical literature we find references to sodomy and pæderasty as common crimes about the existence of which there can be no discussion. Kocher

begins his chapter on this subject with the concise statement that, "Like all the people of the Orient, the Arab is a sodomist," and remarks on the special frequency of the habit in those countries where polygamy is allowed. He quotes Bertherand in calling attention to a peculiarity in the dress of the Arabian pæderast, the ample Turkish pantaloons being provided with an opening at the site of the anus, which, together with the stains surrounding it, constitutes valuable legal evidence.

The most important statistics, however, come from France. Martineau says: "The frequency of sodomy is great, as you may judge from the cases seen every day in my service. Since my lectures on this subject in 1881 (I say it with regret) deformities of the anus due to this act against nature have become more and more numerous, proving that these libidinous practices increase from day to day." Out of 1170 observations made during the year 1880 he found 500 cases of vulvar or anal deformities due to masturbation, saphism, or sodomy.

These figures may be open to criticism on the ground that the French authors believe so implicitly in the physical signs of the habit that they may have argued backward from certain appearances of the anus to the existence of the vice, and in some cases the inference may not have been correct.

The writer defines sodomy as a general term for all forms of unnatural sexual intercourse, regardless of the sex of the parties. It is also applied to intercourse between human beings of either sex and lower animals, and in current literature has too general an application to convey any idea of the particular form of vice indulged in. In its more correct and limited application it refers to sexual intercourse *per rectum* between man and woman.

Pæderasty he defines as rectal intercourse where both parties are males. The Greek *παῖς* signifies a youth and not necessarily a boy, but in modern literature the word is applied only to males and without regard to age. Buggery, sometimes used synonymously with sodomy, and derived from the French *Bougre*, the name of a religious sect in Eastern Europe,—the Bulgarians,—means, properly, sexual intercourse with one of the lower animals. Greek-love is another name for pæderasty. Besides these practices, there is one other—rectal masturbation—which is of direct interest in causing the lesions described.

The writer explains the existence of these habits by the physiological fact that a certain degree of sexual orgasm may be excited in either sex by irritation of the anus and rectum. It may be safely assumed that no man would give himself up habitually to be the passive party in this practice unless such were the case. The habit of rectal masturbation—the irritation of the anus and rectum by the introduction of foreign bodies, such as bottles, candles, and sticks of wood—must be accounted for in the same way. There are, moreover, some clinical observations which indicate that the capabilities of producing an orgasm in this way may outlast the natural sexual power. The men addicted to rectal masturbation are often old and sexually incompetent.

The voluntary practice of these vices being accounted for by a perversion of the normal sexual appetite, there still remain many cases in which their existence is to be explained in other ways. Male children and physically weak male adults have not infrequently been made the passive parties by violence. Many women submit to it from love of gain, and others because forced to do so by their husbands. The fear of pregnancy, vaginismus, imperforate hymen, or any painful disease of the vagina, may account for the practice. But these explanations are by no means sufficient to account for all cases, for Martineau refers to the fact that in certain countries young girls from the age of eight upward give themselves freely to anal intercourse, because the shame of this habit is less than that which would attach to the fact of having lost their virginity when they came to be married.

As to the existence and extent of these practices in America, but little is known and less has been written. This very ignorance on the part of physicians and lack of literature on the subject go far to prove that the vice cannot have reached any such proportions here as must be the case in France and the Orient. Although Martineau finds it pervading all social classes, here it must be searched for among prostitutes, and where men are banded together without approach to the other sex for long periods, as on ship-board.

It is a well-attested fact that all the supposed physical signs of these practices which are so much insisted upon by the French writers may be absent in those who have practiced them for years. Kocher calls special attention to the fact that among the Arab

pæderasts the physical changes are generally absent; and Ligg describes a deaf mute, thirty-five or forty years old, the victim of this habit, whose anus showed no trace of traumatism, and was well closed, being marked only by an absence of the radiating folds. The mucous membrane of the rectum was also normal.

The changes which unnatural intercourse is supposed to produce are relaxation of the sphincter, disappearance of the radiating folds, an infundibuliform shape of the anus, together with, in more marked cases, fissures, lacerations, abrasions, ecchymoses, ulceration, abscess, hæmorrhoids, fistulæ, and incontinence. There is no doubt that all of these lesions may be produced in this way, but only under exceptional conditions. It would certainly lead to error, however, to infer the existence of an unnatural vice from a lax sphincter or an absence of the radiating folds in every case, or even in most cases. The physical signs vary according to the age of the passive party, the tightness of the sphincter, the size of the male organ, amount of violence used, etc., and also according to the frequency of the act. In a young child, and sometimes in an adult, the injury may amount to actual laceration, and be attended by consequent profuse hemorrhage; but it is more apt to show itself in abrasions, bruising of the parts, and ecchymosis. The injuries may be followed by abscess and fistulæ. A case of ischio-rectal abscess was called to the attention of the writer not long since, supposed to be caused in this way; at all events, occurring in a confessed pæderast. In less marked cases a single act may be followed by pain in the rectum, increased by defæcation, tenderness, slight erosions, and perhaps by a slight sero-sanguinolent or mucous discharge. In cases of long-continued indulgence, where more marked changes have been produced, the signs are of a different character. Tardieu illustrates his work with a plate of a patulous anus, in which the sphincter is entirely paralyzed; and Burgeon describes the anus of an idiot, who for a considerable time had practiced this vice, as much dilated and infundibuliform in shape, the mucous membrane blackish, swollen, and ulcerated in spots, and the sub-mucous and muscular layers hypertrophied to four or five times the natural thickness. In such cases there will be incontinence of gas and fæces, fistulæ, and perhaps stricture resulting from ulceration.

The injuries caused by the practice of rectal masturbation are

often much more severe than those due to sodomy or pæderasty. It is this secret vice which lies at the bottom of all the remarkable cases of foreign bodies found in the recta of old men. A bottle in the rectum explains itself, and it is useless to call out the story of diarrhœa or constipation, with which the sufferer always provides himself.

One reason for the fatality of these cases is found in the length of time the true condition is concealed by the patient before his shame allows him to seek medical relief; and another is that in the futile attempts made by the patient to remove the body it is generally either broken or pushed farther up.

Proctitis due to sodomy may be simple or gonorrhœal. The former is due to mechanical violence, and its presence without palpable cause, especially when associated with erosions at the anus, is enough to excite suspicion of the vice.

True gonorrhœa of the rectum, arising either from direct contagion or by inoculation with pus flowing over the anus from the vagina, is very rare. Rollet reports one case, Gosselin one, and Tardieu has never seen one. Bonière experimented and found it very difficult to inoculate the mucous membrane of the rectum with the pus passed through a tube, though the anus was easily affected. On the other hand, Requin believes it almost sure to follow pæderasty with a person suffering from the disease. Individual cases will occasionally be seen reported, and most of the syphilographers acknowledge its existence. The writer has never had occasion to suspect its presence but once, the patient, a woman, denying any unnatural intercourse, and there being other ways of accounting for the very severe proctitis from which she suffered.

The diagnosis must rest upon the confession of the patient, the existence of the signs of sodomy, and the severity of the disease. In gonorrhœal proctitis all the symptoms will be more severe and acute than in any of the simple varieties. The pain is more intense, the discharge very abundant and greenish in color, digital examination will show the increased heat of the rectum, and a speculum will reveal intense redness. The mucous membrane is covered with thick discharge, bleeds readily when touched, and the follicles are enlarged and discharge pus.

The irritating discharge from the anus may cause erosions and fissures, or previously-existing fissures may become inoculated

with gonorrhœal pus and spread in extent. There may be ulceration and loss of substance of the rectal mucous membrane.

The treatment consists in rest in bed, hot sitz baths, anodyne injections of warm starch-water and opium, and perhaps of a solution of nitrate of silver (1 or 2 grs.—ʒj). The diet should be milk or fluids, and the bowels should be kept gently acting with salines. By this means a cure can generally be effected in from a fortnight to three weeks.

Chancroids at the anus may be caused by direct contagion or by autoinoculation, and, though they may be due to unnatural intercourse, they are no proof of the vice. They are much more common in females than males, and to account for this it is only necessary to remember the possibility of accidental contact of the male organ in coition and the facility of autoinoculation due to the proximity of the rectum and vagina.

They may be single or multiple, may be situated at any point of the anus, and may cover a large extent of surface. They often extend upward between the radiating folds, and thus greatly resemble ordinary fissures, or they may extend backward in the fold between the nates, following in extent the natural course of the discharge, but they do not tend to spread upward into the rectum or involve the mucous membrane above the line of the sphincter. When they do so, which is rare, they are of limited extent and well circumscribed. Their existence in the rectum proper has been denied by good observers, the mucous membrane there being believed to furnish no suitable ground for their inoculation.

These sores at the verge of the anus have the same general characteristics as in other places. They tend to spontaneous cure with cleanliness or judicious dressings, and are not very painful except when within the grasp of the sphincter. Even when they have extended upward in this way they still heal kindly and almost spontaneously, and, no matter how large a surface they may have covered, they seldom leave any trace when healed.

In certain rare cases chancroids may be attended by an unusual amount of ulceration known as phagedæna; and in patients with other rectal disease, or with the scrofulous or syphilitic taint, they may assume a chronic type, and the healing be delayed for a long time; but even then they may generally be induced to heal with proper care.

From this general description it is evident that only under very exceptional circumstances will a chancreoid, even when phagedenic, extend far enough into the rectum and cause sufficient destruction with subsequent cicatrization and fibroid deposit to cause stricture. That it may do so the writer is forced to believe from the testimony of others; but it is none the less a clinical fact that it seldom does so, as all having large experience with venereal sores will testify.

Ulceration of the rectum, in the experience of the writer, and of others who have devoted especial attention to diseases of the rectum, *begins within the rectum well above the sphincter, and not at the skin of the anus*, except in some rare cases of lupus, tubercular disease, and rodent ulcer. In the old cases of so-called syphilitic stricture, in which the anus is surrounded by tags of hypertrophied skin with ulcers between them extending upward into the gut, we have no proof whether the ulcers were present before the stricture or resulted from the stricture. The cases are always too old, the conditions too complicated, and the history too confused for a positive opinion on this point. In any case of stricture of the rectum, venereal or not, there is generally ulceration above and below, and most frequently a circle of hypertrophied tags of skin around the anus the adjacent surfaces of which are eroded and ulcerated. To assert that these ulcers are the original cause of the stricture is to assert what has never been proved, and what it is obviously impossible to prove without very careful and prolonged observation of individual cases.

Gosselin is usually quoted as the authority for the idea that chancreoid of the anus is the most frequent cause of ulceration and so-called syphilitic stricture. It is rather difficult to tell exactly what Gosselin did mean in his much-quoted contribution to this subject, but there seems very little ground for supposing that he intended to convey this idea. Although Bassereau had made the distinction between chancre and chancreoid two years before, Gosselin's "chancre" still meant to him, indiscriminately, the hard chancre, the chancreoid, and the mucous patch inoculated by the chancreoid.

What he asserts is that these strictures are neither primary, secondary, nor tertiary manifestations of syphilis as such are generally understood, but something developed in the neighborhood

of the primary sore, comparable to hypertrophy of the labia or condylomata following the primary lesion. They are "due to a special modification of the vitality of the tissues contaminated by the virus of the chancre, comparable to the lengthening and hypertrophy of the prepuce, with contraction of its orifice, which follows a chancre on its under surface, in which the disease is evidently neither an œdema, nor a specific induration, nor a constitutional affection, but a local lesion due to the presence of the chancres, and consecutive to the inflammation which they have caused."

This opinion can certainly be made to teach the chancroidal nature of this affection only by a considerable stretch of the imagination; nor can very much be said for the theory itself except that it seems to be rather a doubtful way of accounting for a doubtful condition, and one which has never been accepted by the profession.

Dr. Mason's paper is very much stronger than Gosselin's in that he plainly asserts the causation of stricture to be the phagedenic chancreoid. He says he has seen "constriction of the rectum follow, and that very *shortly after* the healing of chancreoids had taken place." Van Buren says: "I have also seen chancreoids at the anus become phagedenic and extend within the rectum, and have verified at a later period the existence of stricture of the rectum from the cicatrization, as there was every reason to believe, of the same ulceration."

Bumstead and Taylor speak in the same way, and Mollière says: "Nevertheless, the soft chancre of the rectum does exist, and has even been seen to assume frightful proportions in this deep region." Bridge's case is much relied upon to prove this point, though it is open to grave criticism; for the woman had both stricture and ulceration at the time the case was first seen, and there is no positive proof that the ulceration was chancroidal and not syphilitic.

The weight of evidence is thus seen to be decidedly in favor of the possibility of the causation of stricture by phagedenic chancreoid, but that any large proportion of venereal strictures are caused in this way certainly cannot be accepted, and on this point further clinical evidence is much to be desired.

The diagnosis of chancreoid in this location is easy by auto-

inoculation, if only the probability of its occurrence is borne in mind. Cleanliness, local application of astringents, and attention to the general health are all that is necessary in the way of treatment if the sore does not extend beyond the radiating folds.

Two forms of phagedæna may complicate a sore at the anus,—the acute and chronic. The former is rare and strongly resembles phlegmonous erysipelas following a wound, in that it may involve the tissues to a great extent, cause deep collections of pus and destruction of tissue, and end fatally. The chronic is the one generally seen, and this may go on for a long time, healing in one spot while advancing in another. It is worthy of note that even after months of this process the sore still remains auto-inoculable.

There are other complications of the chaneroid which may obscure the diagnosis. The sore may itself be inoculated with syphilitic virus and assume some of the characters of the hard chancre, especially the induration. In such a case the diagnosis must rest in great measure upon the combination of symptoms. The sore will prevent the appearance of the chancre, but the discharge will be more abundant than a chancre generally produces, and the pus will still be autoinoculable. In addition, there will be characteristic glandular enlargement in the groins.

Mollière has pointed out that the combination of hæmorrhoids and anal chaneroids may cause certain peculiarities in the course of the latter. The sore may after a time lose its auto-inoculability, but still refuse to heal, the surface becoming red and vascular, the discharge sanious, and the sore changed into a veritable varicose ulcer.

In the treatment of chaneroids of the anus many points of difficulty may arise. The sore, from its position in the grasp of the sphincter, may be so painful that nothing can be done to it except by the surgeon himself, and only then by the exercise of the greatest care and gentleness of manipulation; and, although this pain may be at once relieved either by incising the ulcer or dilating the anus, both of these procedures involve a great risk of auto-inoculation. The bowels should therefore be kept gently open by the daily administration of a laxative which will cause easy but not fluid passages. The ulcer should be touched two or three times daily with a weak solution of nitrate of silver (grs. v.- $\bar{3}$ j) on a camel's-hair-brush, and subsequently covered with a small

pledget of soft lint, gently laid into the fissure and pressed down with a probe. With a light touch this may be done without causing pain.

Should the ulcer have reached to the upper edge of the sphincter there may be such contraction of that muscle that this plan of treatment is impracticable, because all parts of the sore cannot be reached by the brush. In such a case ether or cocaine must be resorted to, a speculum introduced, every part of the sore exposed and thoroughly cauterized with strong nitric acid. The acid must be carried under the edges of the ulcer, for the operation will be positively injurious unless thoroughly done.

Should the ulcer have reached such an extent as to render it doubtful whether by any means it can be perfectly exposed it is better not to try cauterization, but to be content with astringent injections frequently repeated. These must be made by a thoroughly skillful hand, for no fresh wounds must be made by the point of the syringe and no pain need be caused by its passage. A small glass point or a small soft-rubber catheter must be gently introduced along the side opposite the ulcer, and about four ounces of water first thrown up to clean the sore. After this has been passed away about two ounces of a solution of nitrate of silver (grs. ii.-3j) should be thrown up and allowed to remain, and this application should be repeated at least three times in the twenty-four hours.

Phagedæna in the chronic form must be treated by destructive cauterization, preferably with the Paquelin cautery, and every part of the ulcer should be destroyed. Subsequently, anodynes may be freely used till the eschar separates, and a healthy granulating surface remains. In the acute form of phagedæna, free incisions may be necessary in the fossæ and over the buttocks, as well as the destructive cauterization.

True chancre at the anus is not very uncommon, though it often passes unnoticed from the slight annoyance it causes. In men its presence is a very strong proof of prederasty, there being no chance of accidental inoculation as in women. When, therefore, Pean and Malassez give the proportion of one chancre at the anus to every one hundred and seventy-five in other parts of the body in men, they also give an idea of the frequency of unnatural vice in France.

These sores are most likely to be mistaken for simple abrasions or fissures. When typical they have the hard, raised outlines and indurated base, but they often strongly resemble the mucous patch. There is little discharge, and it is not auto-inoculable. They tend to heal spontaneously, but may develop into mucous patches. Glandular enlargements in the groins should always be searched for, and in doubtful cases constitutional treatment may be delayed until the appearance of secondary symptoms.

True chancre within the rectum has seldom been observed, though its frequency as a result of unnatural intercourse will never be known, so little local and constitutional disturbance does it cause. The difficulty attending the diagnosis of such a sore is manifest. Its mere appearance would scarcely be conclusive, and the absence of any other sore which might be followed by general symptoms would need to be fully established,—in women a difficult matter.

The secondary manifestations of syphilis around the anus are some of the syphilodermata, mucous patches, and condylomata.

Mucous patches are very frequent, and assume two distinct forms,—the ulcerative and vegetating. The surface of a mucous patch sometimes becomes elevated by an upward growth of branching papillæ, with production of connective tissue and dilatation of the blood-vessels. When this has reached a considerable extent a cauliflower-appearance is the result, and what was at first a simple mucous patch may become a large, warty vegetation surrounded by other similar ones which have sprung up around the original one, and are due to direct autoinoculation. These are known as vegetating mucous patches, vegetating condylomata, condylomata lata, syphilitic condylomata, etc., and it is to them, to the exclusion of all other varieties of warty growth of non-syphilitic origin and of tags of skin, whether attended by syphilitic lesions in the bowel or not, that the name of condyloma should be limited.

The vegetating mucous patch is particularly common around the anus and sometimes grows to a large size, nearly filling the intergluteal cleft. The secretion is in the highest degree infectious, and is also autoinoculable. The spreading of the growth where it comes in contact with a moist surface may be accounted for by

direct autoinoculation, and also by the general syphilitic infection, which at this stage is particularly apt to manifest itself in mucous patches at any point in the body which is both moist and irritated. For this reason these growths are most developed in fat people of uncleanly habits.

The treatment is first constitutional, and then, if necessary, the destruction of the growth with acid.

One point of great interest in connection with these syphilitic warts is that they strongly resemble another variety of warty growth which is often seen in the same place, but has nothing to do with syphilis, and may be entirely independent of any venereal disease whatever.

The differential diagnosis may only be possible by the history and the absence of any other signs of syphilis. Under the microscope the stricture is not the same, the non-syphilitic wart being an hypertrophy of the rete malpighii, and the other an hypertrophy and branching of the papillæ.

The most satisfactory way of curing these vegetations is by paring them off with knife or scissors. They may be ligatured or destroyed by acid, but the former plan will cause the least trouble. They may also be made to dry up by applications of alum or tannin in powder, or by frequent washing with Labarraque's solution.

There is still another form of new growth around the anus which is generally called condyloma, though improperly and for no particular reason. In fact, the term condyloma has been applied to so many totally different varieties of growth here that it has come to have no definite signification. It would be much better could it be limited to the syphilitic patch. The growths now referred to are composed of skin and connective tissue, are attached by a broad base to the verge of the anus, are pinkish in color, soft, fleshy, and irregular in shape, flattened against each other where two come in contact, and often excoriated on the anal surface, and therefore giving out a slight secretion. These generally spring from one of the radiating cutaneous folds of the anus, and consist of an hypertrophy of the whole thickness of the skin. Their size varies from a pea to that of the end of the thumb, and they may be single or multiple. They are the result of a chronic inflammation of the skin caused by any form of irritation. They are

typically developed in cases of stricture and ulceration of the rectum, and are due to the irritation of the discharge flowing over the anus. The hypertrophied tag may not only be excoriated but ulcerated, and may even take on acute inflammation and suppurate, but it is generally more annoying than painful, the discharge from the surface keeping up a constant irritation of the adjacent skin.

Paget has said that, without considering these growths always and absolutely syphilitic, they are so rare without it that he has never seen a case. This statement from such an authority is incomprehensible to the writer. They are often seen in connection with syphilitic stricture, and it is true that in these cases they will sometimes atrophy under iodide of potash. But they are also found in connection with non-syphilitic strictures, and, indeed, with any ulcerative disease causing an irritating discharge.

These tumors occasionally reach a large size. Barnes reports one as large as an orange, which protruded from the anus during labor. It was a dense growth attached at the margin of the anus, the rest of the circumference being surrounded by piles more or less indurated. At one point the tumor was greenish, as if about to slough. Under the microscope it was seen to be composed, for the most part, of loose fibro-cellular tissue, covered by tough and altered mucous membrane; the deep parts were, however, cavernous in structure.

Do mucous patches ever occur within the rectal pouch? From analogy with the fauces alone it would probably be safe to answer in the affirmative; but this is one of the points upon which further clinical testimony is much to be desired. Mollière reports such a case,—a white, pearly, rounded plaque in a syphilitic subject, about one cm. in diameter and five cm. above the anus.

It is known that any ulceration, often of very trifling nature originally, may in the rectum, under the influence of the irritation of feces, assume considerable proportions; and it has been assumed rather than proved that a mucous patch in the rectal pouch may in this way become the cause of destructive ulceration, subsequent cicatrization, and hence of stricture, so-called syphilitic. There is no clinical proof of this, nor are we forced to accept any such theory, however probable or plausible it may be, to account for the strictures and ulcerations of the rectum occurring during secondary syphilis.

Of the existence of syphilitic ulceration of the rectal pouch occurring in the late secondary or early tertiary stage of the disease there can be no more doubt than of the existence of the same affection in the fauces and trachea, where it is more easily discoverable, and hence has been more often described. The ulcer is due to the deposit of syphilitic tubercle in the mucous membrane, which rapidly comes to the surface, disintegrates, and leaves a small, well-marked loss of substance with clearly cut edges and yellowish, purulent base. When these ulcers coalesce there is sometimes great destruction of tissue, and large cicatrices follow their healing. Their favorite site is the lower part of the rectum, and when found in great numbers they will gradually decrease in frequency as the bowel is followed upward.

This form of ulceration is, according to the writer, entirely independent of any venereal lesion at the anus extending into the rectal pouch. It is syphilitic, and belongs to a late stage of syphilis. Moreover, it begins an inch or more above the sphincter, and not at the anus. While some observers have sought to establish that syphilitic stricture was not syphilitic, but chancroidal, and due to the extension of ulceration from the verge of the anus, the existence of this form of disease has not been denied, and to it a certain number of true syphilitic strictures are due. This is, of course, in direct opposition to the views of Gosselin and Mason, but those views have never been to any extent accepted by the profession, while those who have studied them from the standpoint of the rectum are unanimous in rejecting them.

This form of ulceration has long been recognized, and has been thoroughly described by various writers, more particularly Curling and Paget.

This and one other are the morbid processes which explain the fact that in about 50 per cent. of all strictures, non-malignant, there is a history of constitutional syphilis. Such a fact would not be disregarded in the study of the etiology of any other morbid process, nor should it be in this. If one-half of all non-malignant strictures occur in syphilitic patients it is only fair to infer that syphilis has some causative influence.

In the differential diagnosis of syphilitic from other forms of ulceration the history is of great importance. The appearance of the sore is scarcely characteristic enough to warrant a positive

diagnosis unless all the facts of the case point in one direction, and the failure of anti-syphilitic medication is of no negative value, for the late manifestations of syphilis in the rectum often refuse to yield to either mercury or iodine, though both should always be tried. Traumatism, whether surgical or other, may easily be eliminated, and the only remaining sore at all resembling syphilis is the tubercular. The diagnosis between these two may be impossible, but it can generally be worked out with great probability if care be used.

The other tertiary manifestations of rectal syphilis are neoplastic in character. Circumscribed gummy deposits of greater or less extent have been quite frequently noted, and are not as rare as would seem to be indicated by the statement of Fournier that he has never seen a case. Other observers have reported isolated cases, and R. W. Taylor has recently given the notes of four. The deposit may occur in any part of the bowel. In one of Taylor's cases it was in the recto-vaginal septum, had ulcerated through and caused a recto-vaginal fistula.

Instead of being circumscribed, this gummy deposit may involve the whole circumference of the bowel and extend from the sphincter as far as the upper limit of the rectal pouch. This is what Fournier has described as ano-rectal syphiloma, and what he believes to be the causation of most syphilitic strictures, though he also recognizes the causative influence of late syphilitic ulceration.

As described by him, the disease commences as an infiltration of the rectal wall by a neoplasm. The deposit is entirely sub-mucous and occurs by preference in the rectal pouch, always encircling the whole calibre. It may also involve the anus, and may take the form of anal tags and tumors described when speaking of condylomata.

At first it merely causes thickening and stiffening of the gut with loss of dilatability, but there is no contraction and no ulceration till later. As the deposit increases in amount, the mucous membrane over it loses its vitality and becomes ulcerated, and the deposit itself finally degenerates into fibrous tissue, retracts, and causes stricture.

Under this new name—ano-rectal syphiloma—Fournier gives a complete history of the origin and development of the ordinary

syphilitic stricture as seen by every practitioner. It must be admitted that in most cases of syphilitic stricture there is more infiltration of the rectal wall, more occlusion of the canal by hard masses of tissue; more extensive changes, in other words, than can easily be accounted for by mere cicatricial contraction; and it seems exceedingly probable that Fournier has more correctly described the true nature of the pathological process than any previous writer. Syphilitic stricture, as generally seen, is just such a combination of ulceration, infiltration, and contraction as he describes ano-rectal syphiloma to be in its more advanced stages.

This affection is said by him to be curable in its early stages (before degeneration and contraction have occurred) by specific treatment, but he has never seen but two such cases.

In addition to these tertiary manifestations of syphilis Mollière describes a stricture due to a specific inflammation of the rectal coats. He says the muscular is replaced by connective tissue which, by sclerosis, causes atrophy of other muscular fibres. The origin of the trouble is said by him to be in the muscularis, and not in the sub-mucous connective tissue, as with other forms of stricture.

Gummata.—Verneuil⁷¹ reports four cases as all he has ever seen. The first occurred in 1846. The patient, a man, had fistulæ all around the anus. Some were indurated, some ulcerated, and some led into blind external pouches. Healing took place under specific treatment. The second case was in a robust man, who had an induration at the margin of the anus extending upward to the ischio-rectal fossa, and painless on pressure. Walking caused pain. The swelling softened in the middle, was incised, but only blood escaped. Some days later suppuration occurred. The ordinary operation for fistula was performed, but the opening would not heal, and the surrounding parts remained indurated. Specific remedies were then given, and in a short time the patient was cured. A third case was that of a man who had an indurated swelling of the buttocks. There was an opening in it with violet-colored edges. This was considered to be a gumma, and rapid improvement occurred under treatment. In the fourth case the patient was a woman in whom tertiary syphilis occurred about the age of 50. She also had a broken-down gumma near the anus.

These cases were worthy of note on account of the supposed great rarity of gummata of the rectum and anus.

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SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE.

By E. L. KEYES, M.D.,

NEW YORK.

THE PREPUCE.

BUT little has been done relating to maladies of the prepuce during the year 1887. A few articles concerning relief of nocturnal incontinence and obscure disorders supposed to be due to reflex causes have appeared from various pens, but nothing novel of any special importance has been written.

A new instrument for facilitating the performance of circumcision is described by R. Wittelshöfer,¹ of Vienna, and a new preputial dilator, similar to the three-branched instruments always in use, has been devised by W. S. Stewart,² of Philadelphia.

An unusual complication is reported by Holger Mygind,³ of Copenhagen. A boy of fourteen is recorded by Möller⁴ as having a retention of urine with phimosis. After circumcision the glans penis was found to be covered with a membrane adherent to the base, but not to the surface of the glans. This membrane was perforated in front by a narrow hole. From the inner surface of the membrane, corresponding to the orifice of the urethra, which was situated a little lower down than usual, a tube-like prolongation continued down into the urethra, without adhering to the mucous membrane. This was ruptured by manipulation at a distance of one and a half centimetres from the meatus and extracted. A small catheter could then pass easily into the bladder.

THE PENIS.

J. H. Brinton,⁵ of Philadelphia, has published an interesting case of horny growth found upon the penis of a farmer sixty-two years old. It sprang from the base of the glans penis at the coronal border, and was attached both to the glans and to the body of the penis. It measured one and seven-eighths inch in

length, and one and three-eighths in circumference at the base. There was a plate of horny tissue encircling the end of the glans penis, surrounding and narrowing the meatus. The frenum was gone. The horn was striated like an exaggerated thumb-nail, and when dry, of smooth, polished appearance.



HORN GROWTH OF PENIS.—(*Medical News*.)

Brinton reproduces all cases previously reported, fifteen in number, and a few other cases of horns growing from the prepuce and scrotum.

J. F. Baldwin,⁶ of Columbus, Ohio, adds another case of horny growth upon the penis, an inch in length, growing from the glans; still another case is quoted from the *Indian Medical Gazette*.

THE URETHRA.

Rupture of the urethra has occupied a moderate amount of attention, a general essay covering the whole subject having appeared from the pen of A. Etienne,⁷ of Toulouse. Mr. Wright,⁸ of the Manchester Royal Infirmary, encountered a case of rupture in which the spongy urethra was severed as a complication of a lacerated wound of the scrotum. The severed ends of the urethra, which were found to be separated about an inch and a half, were brought together with four points of catgut suture. A catheter was left in the bladder. A little urine escaped through the wound. The catheter was removed on the seventh day, and the patient recovered entirely, but slowly. Wright believes that this is the first instance on record in which the spongy urethra was sutured for a fresh transverse wound.

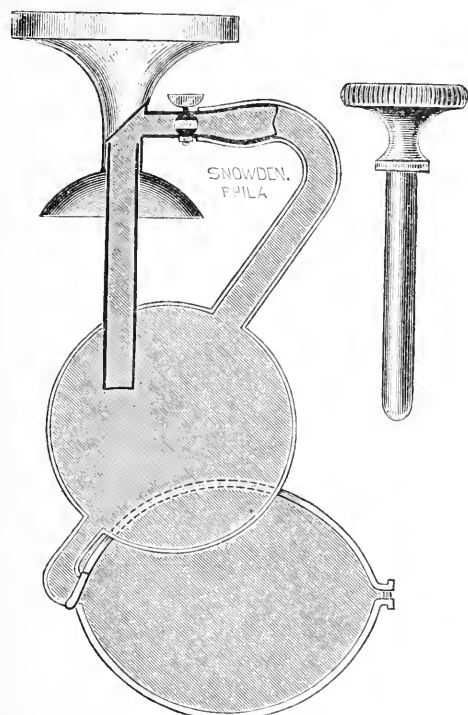
Vincent,⁹ of Lyons, speaks of a boy of eight or ten years who fell across a plank and severed his urethra so that the ends separated three centimetres. Vincent resorted to an immediate suture with perfect success.

That immediate suture of lacerated wounds of the urethra is not always desirable must be inferred from the experience narrated by Lucas Championnière,¹⁰ at the twenty-sixth meeting of the Society of Surgery in Paris. He cited two observations of Locquin, of Dijon. In one the attempt at primary union was unsuccessful. The wound required to be freshened later on, and the divided canal reunited. The second operation succeeded, but as cicatricial stricture resulted a subsequent operation was called for, in which the cicatrix was excised and the separated parts of the

urethra again united. Championnière¹⁰ performed perineal section upon a patient who had ruptured the urethra the day before, and united the wound immediately upon a sound *à demeure*, without paying any special attention to the severed ends of the canal. This was June 24. Eleven days later the catheter was taken out, and on the seventeenth day the patient left the hospital, well, without fistula.

ENDOSCOPY.

But little advance has been made in any essential particular, so far as urethral tubes are concerned, and methods for inspecting the canal, excepting such as



ANTAL'S AERO-URETHROSCOPE.
(*Centralblatt f. Chirurgie.*)

attach to new methods of illumination and belong strictly to instruments whose main function it is to make visual inspection of the bladder possible, and which will be referred to later on.

The only notable exception involving a new principle is the aëro-urethroscope devised by Gèza von Antal,¹¹ of Buda-Pesth.

This instrument aims at securing a bird's-eye view of a considerable area of urethra in one field. The inventor claims that all endoscopes so far in use have the disadvantage that only a single point of the urethra can be inspected at a time, namely, that portion of the canal coming into view at the end of the tube while the latter is being withdrawn. Antal's instrument distends the urethra with air allowing all the inflated portions to be inspected at once. The instrument consists of a 2-4-6 cm. long tube, with obdurator. A concave shield fits over the glans penis against which the urethral orifice can be drawn upward so as to make it air-tight. After introducing the tube, the ocular part, rendered air-tight by a glass plate, is attached. By means of another tube the urethra is now distended with air. The deep urethra at the bulb, or in its membranous part (by a finger in the rectum), is compressed by an assistant to keep the air from entering the bladder. The urethra may now be illuminated and inspected. The field is several centimetres long. The canal does not become evenly dilated, but seems to be ringed like the trachea. The mucous membrane looks paler than normal because it is stretched, but the variations in color are very clearly shown. With a long tube the sinus of the bulb up to the membranous urethra may be clearly inspected.

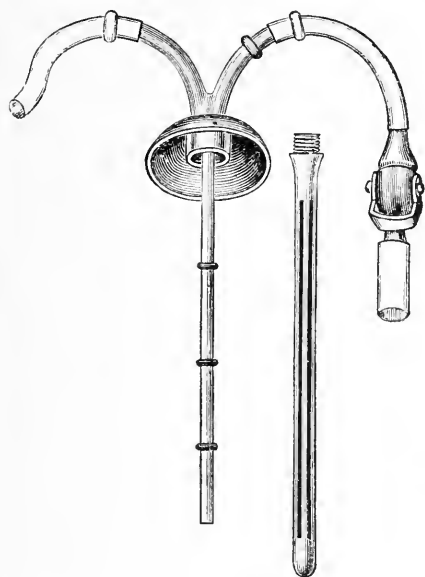
The sensation produced upon the patient is not disagreeable under moderate distension,—up to 1 cm.

Antal,¹² in a long article upon this instrument, gives chromolithographs of the visual field the artistic merit of which does not justify a reproduction here.

KATHARAPHORE.

Under this name an instrument for cleansing the urethra of its discharges has been devised by Zuelzer.¹³ The bell covers the glans penis. The tube (distinguished from its fellow by a raised ring) is connected by an irrigator and terminates within the straight tube, which is four and a half to five inches long, with a free opening at its end. The outer tube, which encases the more central one, is screwed into the under surface of the bell, and communicates with an out-flow tube. This outer tube

is of metal, closed at its lower end, having a tip like that of a catheter and sides perforated by four long slits. The tube itself is prevented from bending inward upon the inner tube by three raised rings upon the latter. The mechanism of the irrigation is obvious, and good results are claimed from its efficiency in thoroughly washing away urethral discharges.



KATHARAPHORE.—(*Medical News.*)

URETHRAL INFLAMMATION.

The struggle over the gonococcus has somewhat abated of late. George E. Brewer, of New York, read an article before the New York Dermatological Society in the spring of 1887, a summary of the treatment of urethritis by modern methods, in which he brought the matter

up to date and declared himself a strong believer in the gonococcus of Neisser. The various irrigation methods were described which, if they have not sprung out of the cryptogamic theory of the disease, have at least been fortified by it, and their efficacy thus founded upon a somewhat scientific basis.

These methods continue to thrive in New York in a progressive manner. The irrigation as commonly practiced is most often a hot, weak solution of the bichloride of mercury. It is used profusely, a pint to a quart or more, at a strength varying from 1 in 20,000 to 40,000. The irrigator of Klotz, of New York, is very popular, or any blunt nozzle fitted to a fountain-syringe. The irrigations are performed from two to four times a day. For people who for any reason (travelers, etc.) cannot use the fountain-syringe I have substituted with entire satisfaction a red-rubber, blunt-nozzled ball-syringe, made by Tiemann & Co., called the "Universal Injector." This, of course, has to be filled and emptied many times, but with it irrigation can be performed as effectively as with any apparatus, the patient making his injecting material as

he goes by dissolving bichloride powders of a given size in a tumbler (3vijj) full of hot water.

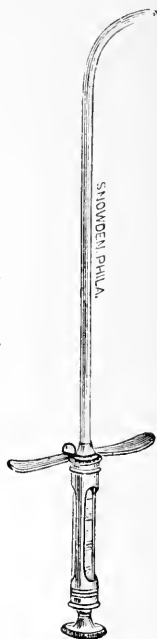
This irrigation is commenced, at mild strength, at the very beginning of the discharge, and although it does not cure a virulent case at once it modifies it as a rule more favorably than other methods, reducing all the symptoms, notably the discharge, and conducts the patient through his attack in perhaps half the old-fashioned time.

Toward the end he needs often other more astringent forms of injection administered with an ordinary blunt-nozzled syringe, but sometimes he gets well under the irrigation alone, as far as local treatment is concerned.

In the gleet, which prolong themselves by lingering in the deep urethra as urethral granulations, prostatorrhœa, etc., and indeed in many other inflammatory and neurotic conditions of the canal, I have employed of late years, with considerable satisfaction, the nitrate of silver in varying strength as a deep urethral injection.

I endeavored to bring this method into greater favor in this country by giving my experience at length at the first meeting of the American Association of Genito-Urinary Surgeons, at Lakewood, in May, 1887.

The long advocacy of this means by Guyon, of Paris, and Ulzmann, of Vienna, each of whom has his own special instrument for making the application and his own theory of its action, is sufficient to add interest to the study and to make further investigation profitable. Guyon's instrument has an acorn-head, and injects backward from the shoulder of the acorn. Ulzmann's instrument is open at the tip, but, being made in two parts, gets out of order easily and is difficult to use without soiling the fingers of the operator. I have devised an instrument in one piece open at the tip, with silver shaft and broad wings to indicate its position and facilitate accuracy of injection. It cannot leak. The method is, for deep urethral injections, to throw into the centre of the membranous urethra from 1 to 5 drops of a solution of nitrate of silver, from $\frac{1}{2}$ gr. to 60 gr. to the ounce. In prosta-



KEYES' INJECTOR

torrhœa and gleet arising from inflammation of the membranous urethra two drops of injection suffice. For cystitis of the vesical neck five drops is ample.

The maladies in which this method has yielded exceptionally good results are gonorrhœal cystitis (the more acute the attack the better), irritation of the bladder, suppurative inflammation of the deep urethra, relapsing epididymitis, irritative troubles attending enlarged prostate, prostaticorrhœa, spermatorrhœa, deep urethral neuralgia, loss of erectile power, etc. This treatment, if useful at all, is always promptly beneficial from the first, and all the result possible can usually be attained by half a dozen applications. The surgeon therefore immediately learns whether or not he is on the right track, and need not persevere if the method prove incapable of modifying the symptoms.

The injections are repeated at intervals of two to eight days, the strength of the solution being gradually raised.

Chazeaux,¹⁴ of Lyons, claims to have found a virulent gonorrhœa due to the rheumatic diathesis in the discharge of which there are no gonococci. Discharges due to rheumatism cause naturally do not contain gonococci, but so far as known no one heretofore has claimed the quality of virulence for such a discharge.

The only especially novel substance for which much is claimed on account of alleged ability to control gonorrhœal discharge is the sulphate of thallin,— $C_9H_{10}N(OCH_3)$. The chemical name for this material is "tetrahydrotarachinanisol,"—a substantive which does not commend itself for general adoption. Goll,¹⁵ of Zurich, praises this substance very highly, believing that it possesses antiparasitic power capable of destroying the gonococcus, and that it penetrates the submucous tissues more deeply than other substances, with a correspondingly less degree of local irritating action. I have used it to a moderate extent, and thus far think reasonably well of it, but have not enough experience to allow me to endorse the high praise which Goll gives it.

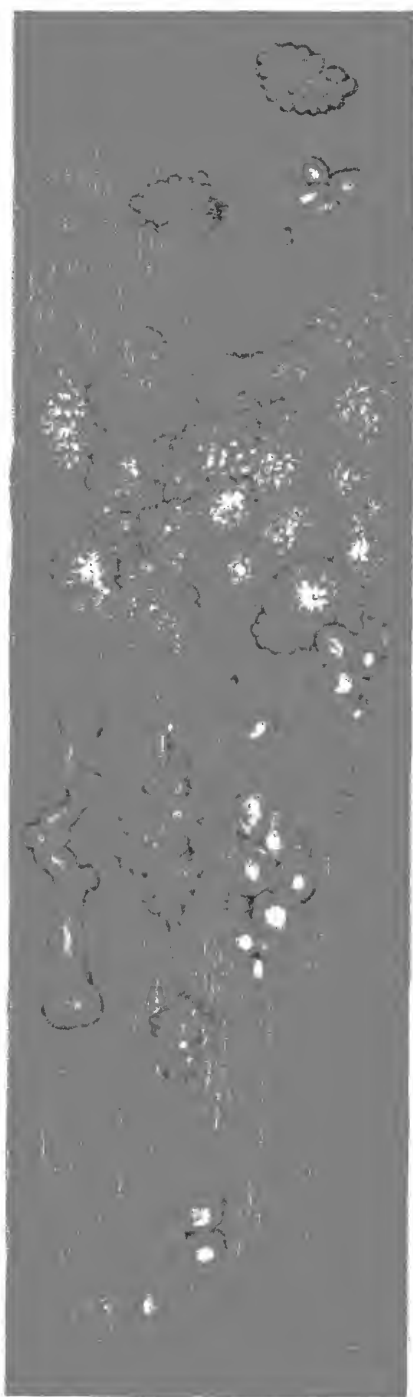
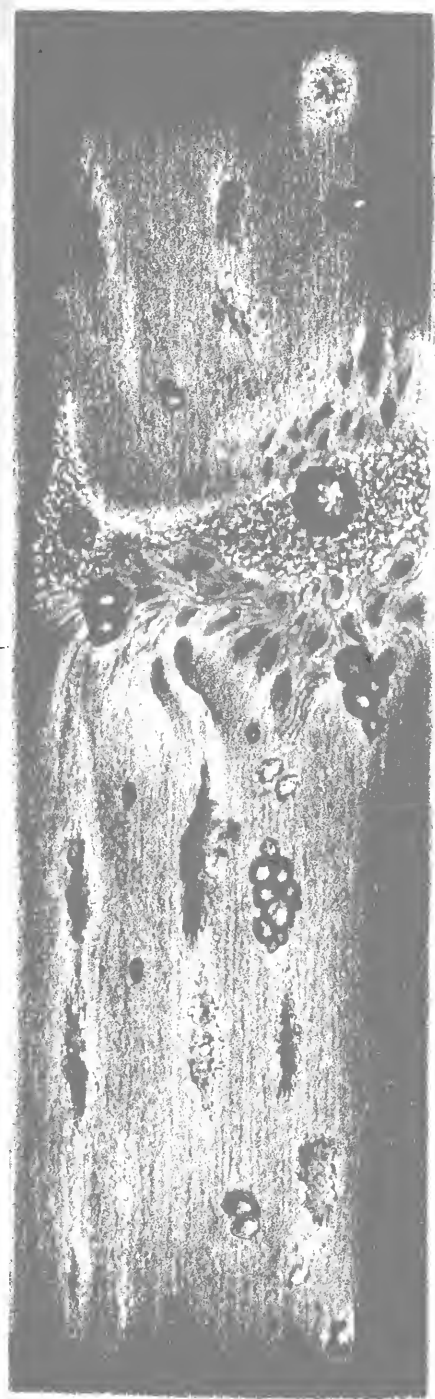
He uses it in a 1 per cent. to $2\frac{1}{2}$ per cent. solution as an injection in the acuter stages of inflammation, running up to as high as 5 per cent. or 7 per cent. solutions for the more chronic forms and for use in the deep urethra. I have employed 15 per cent. solutions both in the anterior and membranous urethra without material irritating effect. Goll does not claim to be able to abort

the disease, but does claim to shorten its duration. The substance is not expensive. Some American journals, in commenting upon the use of this new salt, have wrongly quoted that the sulphate of thallium was the substance to be employed. This latter is very expensive, and, so far as I know, has not been used for the object indicated.

An admirable study upon papillomatous inflammation of the urethral mucous membrane has been contributed by Oberländer.¹⁶ He does not believe that warts under the prepuce or in the urethra are due to gonorrhœal infection, as has been held, yet he does consider them contagious. He alludes to a preputial catarrh accompanied with papillomatous formation in dogs, which is communicable by cohabitation and to the lips of the bearer. He concludes that the human variety is contagious without being directly specific. Irritating secretions of any sort are sufficient to act as a first exciting cause. The inflammation and discharge in this affection are chronic from the first, and of light grade. Individual peculiarity plays an important rôle.

Urethral warts are exactly like subpreputial ones, varying in all sizes from the most minute. He considers that some individuals after gonorrhœa continue on with a discharge due to hypertrophic urethritis. Others with stronger predisposition go on to papillomatous urethritis. The malady may last indefinitely, although the individual warts disappear to be replaced by others. He has seen warts in the urethra of a patient who had had a discharge for twenty years. The warts may occupy any portion of the urethra, but are most common near the meatus. The two plates (chromo-lithographic) show a urethritis mucosa hypertrophica with its dark-red color, longitudinal streaks, hypertrophied glands, and numerous papillomata, single, simple, complex, and grouped. The worm-like body is a fibrous papilloma, observed and reported by Oberländer as the *colliculus seminalis*. The companion cut represents the same field during treatment. Everything is on a smaller scale, with superficial and deep scars at the site of the removed papillomata.

Treatment.—All the papillomata must be removed. Grünfeld's instruments and method are not approved by Oberländer, who, after cocainizing the urethra, proceeds as follows: He places with a tube two large, tightly-made, cotton tampons, one



Urethritis Mucosa Hyperthrofica

behind the other, just in front of or in the midst of the condylomatous mass, upon tampon-holders; and then, with the tube in up to the diseased area, he straightens out the urethra, and by rubbing the two tampons back and forth upon each other he destroys and removes all the soft papillomatous bodies, using other tampons after the first become soaked with blood. He cautions against too much as well as too little friction, and repeats the operation at intervals of a week until all the papillomatous points have been removed by ecrasement. Bleeding is moderate and quickly arrested by cold-water injection. Three or four sittings generally suffice for a cure, aided later by local cauterization and dilatation. In very chronic forms the thickening and stricture of the urethral membrane must be attended to by the usual means.

URETHRAL ARGYRIA.

Grünfeld¹⁷ reports a case of nitrate of silver staining of the urethra, due to mild injections used by a patient upon himself for a year. The whole canal from the sinus of the bulb forward was darkened. The shade deepened toward the meatus. One spot in the urethra was a white scar from an injury of later date than the argyria.

MELANOSIS OF THE URINARY TRACT.

A. W. Stein, of New York, has encountered recently a case of melanotic sarcoma in which the disease appeared primarily in the genito-urinary organs. The case is peculiar on account of its comparative rarity. There were no local symptoms, so far as the bladder or urethra were concerned. As usually occurs, all the organs and tissues of the body were found to be involved, on autopsy.

STRICTURE.

Fashions in surgery, if not as rapid in their changes and not perhaps as capricious in their modifications as those experienced by the bonnets and bustles of the fair sex, are yet very exacting, and liable to be followed with more zeal than judgment by many, especially the younger members of the profession. Every one accustomed to encounter obscure cases of genito-urinary disease, especially those of a chronic nature, which have already passed through the hands of several practitioners, is familiar with the fact that of late years it is the rule rather than the exception for such

cases to present themselves with traumatic hypospadias, the result of the zeal of some surgeon who has been consulted, and probably with a story that their whole anterior urethra has been cut to a size among the thirties, under the assurance that this would cure the malady. This is the natural result of the modern fashion of meatotomy and urethrotomy which has run riot in the profession, and led to much unnecessary surgery and to some positive injury to the victims of the fashion. Several protests have been attempted with more or less force.

H. H. Bennett, of Brooklyn, has been an outspoken denouncer of what he considers promiscuous meatotomy, and has claimed that certain urinary and copulative functions lost through meatotomy have been reclaimed by surgically restoring the overcut meatus to its normal size.

This assertion possibly lays Dr. Bennett open to the charge of a little too much positiveness on the other side of the question. My own impression, which I believe to be unbiased, is that meatotomy is more often unnecessary than actually harmful, and that it is too often performed in a routine way, notably by young surgeons who expect in some mysterious manner to accomplish a miracle by it. This routine practice of cutting every small meatus that comes in sight leads to a neglect of such a study of the case as is often necessary to decide the seat and cause of the symptoms. It fails in its pretended efficacy, and conduces to despondency on the part of the patient and an ultimate loss of reputation to the surgeon.

I have gradually reached quite positive views on the subject of deep urethral muscular spasm. It has never been my fortune to encounter deep urethral spasm caused by anterior stricture of large calibre, or to relieve it when it exists by meatotomy (for such large-calibred meatus), or by the division of the so-called stricture of large calibre in the anterior urethra. A pin-hole meatus may cause vesical irritability with perhaps some spasms, and a positively small meatus may do the same, but that a reasonably large meatus (size 12 English) can cause deep urethral spasm, unless it act in concert with another cause, I have yet to see to believe. My impression is that the cases of deep urethral spasm which are cured by meatotomy really get well on account of the effect of the passage through the deep urethra of the large sound which the

cut meatus admits, and that if in these cases the surgeon had confined his efforts strictly to the meatus and let the deep urethra alone the spasm would have remained.

An exception may be made for some impressionable patients who get well by the action of the moral effect of the surgery employed.

Two striking cases I can recall which bear upon the point just made. G. Raney¹⁸ furnishes the case of a young man who for five years had suffered from functional symptoms ascribed to urethral stricture. He had never had gonorrhœa or any urethral injury; he was a nervous individual. Finally, in November, 1885, a surgeon cut him internally (*"se crut obligé de lui pratiquer d'urgence l'uréthrotomie interne"*). No good effect followed. Then urethral spasm was thought of, and by the aid of *"la suggestion hypnotique"* the patient was radically cured at the second sitting of all his urinary troubles, and the cure had remained permanent for five months after the date of the report of the case.

Davenport¹⁹ mentions an old man who had suffered from signs of deep urethral obstruction for ten years. He was relieved at once, and permanently, by a single passage of a silver catheter. Had his meatus been cut before the catheter was passed another victory would have been falsely imputed to meatotomy.

My suggestion is, to all investigators studying the effect of cutting the so-called anterior strictures of large calibre upon genito-urinary symptoms, or other symptoms believed to be reflex, that they confine their surgery absolutely to the urethra in front of the triangular ligament, and never enter the membranous urethra until the full effect of the cutting (not the first twenty-four hours, but later) has been studied. This will judge the question more accurately. Cutting truly narrowed points in the anterior urethra I believe to be good surgery; but cutting every point at the meatus and in the third inch simply because these points are (as they should be normally) narrower than other points in the canal I believe to be routine surgery of a very unprofitable sort. The alleged good that comes of it my observation forces me to believe is about on a par with that which might be attained by that very unsurgical method, *"la suggestion hypnotique."*

Otis²⁰ emphasizes the well-known fact that interference with the deep urethra involves an element of danger from which surgical

manipulation of the pendulous urethra is nearly exempt, and he urges that no instrument shall be passed into the bladder, and that anterior stricture shall be first dealt with. This rule is well enough, unless viewed from the standpoint that any spot in the front urethra narrower than any other spot is a stricture. Such a generalization prevents investigation, which often cannot be properly carried out without passing an instrument as large as will go into the bladder itself. If the point of moderate physiological narrowing in the middle of the pendulous urethra is considered a stricture, routine surgery seems inevitable, and a man who urinates too often will have his urethra cut when he may be suffering from stone in the kidney or bladder, from chronic pyelitis or other malady; and I have known this to have been done in many instances.

A patient recently applied to me with shreds of pus, long and in clumps, and enough free pus in the urine to make it resemble sweet cider. He urinated with pain every two hours, night and day. There was mild gleet.

The case was one of prostaticorrhœa and cystitis of the neck. This gentleman assured me that nine months previously, with the same symptoms, he had applied to a surgeon who passed a bulbous sound and assured him that he had five anterior strictures which must be cut. The surgeon said it was not right to explore the deep urethra, because this was dangerous. The cutting was done, but the promised cure did not follow. Other anterior strictures were then discovered, and cut again and again, five times in all, during nine months, the surgeon making no further investigation and always declining to look into the condition of the deep urethra. Finally at a given visit the surgeon again introduced the bulb, and after carefully pulling it out exclaimed: "By Jove! you've got eight strictures yet." The patient declined to have these cut, sought other advice, and recovered almost entirely from his symptoms after a few weeks. He declared that he believed his surgeon to be honest and trying to do for him the best he was able. This surgeon evidently had too much confidence in anterior contraction as a cause of symptoms, and from excess of zeal became a routine surgeon, and therefore an unsafe guide.

Among the general articles covering the subject of stricture, must be mentioned an essay by Géza von Antal,²¹ a small book by

A. Settier, of Madrid, who follows French methods in all respects, and a written communication by Manuel Dagnino,²² of Caracas, Venezuela, giving his personal experience with 500 cases, of which 142 were treated by internal urethrotomy, 12 by external urethrotomy, and 346 by gradual dilatation. One death only is mentioned.

The urethrotomes of Maisonneuve and Phillips were used, and French ideas generally followed. As the strictures were not located as to their urethral position the communication loses statistical value.

Lucas Championnière²³ speaks of the high esteem in which internal urethrotomy is held in France, taking for his text a recent

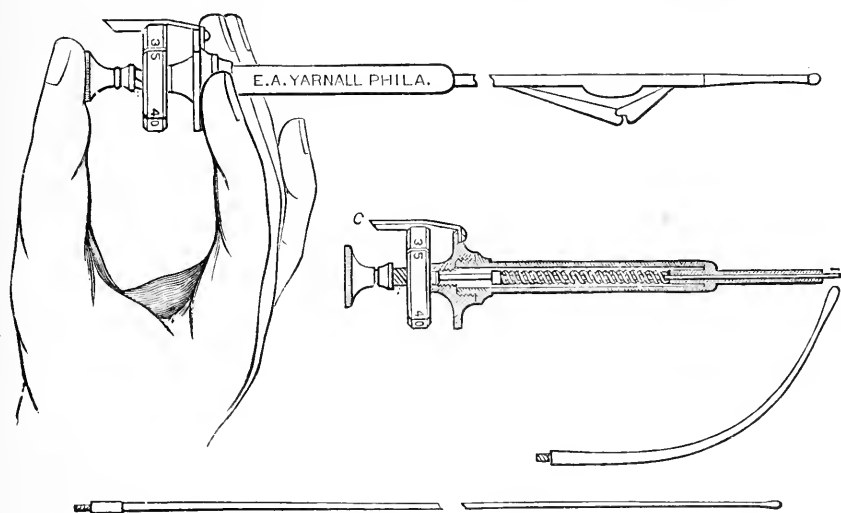


Fig. 3.

FLEMING'S URETHROTOME.—(*London Lancet.*)

discussion in the Society of Surgery. Guyon, who constantly practices this operation, made a long communication to the society upon its harmlessness. Most French surgeons use the instrument of Maisonneuve. Harteloup has an instrument of his own.

Fleming,²⁴ of Glasgow, has introduced a new urethrotome which has certain features to commend it. He states that a perfect urethrotome should have seven qualities:—

1. To be used with one hand.
2. To cut from behind forward and the other way,
3. To cut any part of the urethral circumference.

4. To cut to any depth, and to have the depth regulated while the blades are out of sight in the urethra.

5. To have the smallest possible shaft.
6. To be adapted to carry a guide bougie.
7. To be easily cleaned.

The cut represents the instrument which attempts to meet these requirements. The three figures show the conductor, the instrument ready for action, and the mechanism, with the extra point. The different parts may be separated for cleaning.

RESECTION OF THE URETHRA FOR STRICTURE.

Heusner²⁵ details the case of a man 38 years old, who two years previously had had his membranous urethra crushed. Abscess and cicatricial stricture followed, and one year later perineal section, but the stricture recontracted so that the patient suffered much distress, and was obliged to resort to the use of a catheter several times daily. June 1st, 1883, Heusner dissected out two centimetres of thickened urethra, all the strictured area, which included a portion of the bulbous and of the membranous urethra. The cicatricial tissue was sharply bounded at each end by healthy mucous membrane. It was excised by being split, and then dissected out with some difficulty on account of its dense adhesion to surrounding parts. The excised portion was lined with granulations and wart-like excrescences. After the excision the cut ends of the urethra separated about three centimetres. The prostatic end could only be pulled slightly forward. The front end was loosened with scissors from the pubic arch and corpora cavernosa for about one and a half centimetres, after which the cut ends could be approximated. They were sutured with five points of catgut. The wound was drained and a catheter tied in until June 13th. The outer wound healed mostly by first intention, but the urethral sutures did not hold and some urine escaped from the drain after the fifth day. Heusner thinks that this leakage was due to his having left a catheter tied in, and declares that he will omit the catheter in his next operation and drain the bladder if necessary by a special tube passed through its neck (and doubtless out through the perineum, although he does not distinctly state this).

On July 5th the patient was discharged, able to take by the urethra a number 24 catheter. No sound was used as after external urethrotomy.

One year after the operation investigation showed that the cure had been permanent, and in a letter written August 1st, 1886, the patient declared himself well, saying that he had never since the operation had occasion to use a catheter.

Another case, published previously by Heusner and treated without sounds, died two and a half years after the operation. His stricture had partially recontracted (to size 20), and he died of kidney and bladder disease. Autopsy showed at the site of the urethral operation a fine linear scar. Heusner refers to a similar operation by König, of Göttingen, published in 1882, stating that he was not aware of this operation at the date of his own first effort.

ELECTROLYSIS.

The use of electricity for the cure of stricture has increased the number of its advocates, all of whom claim success by methods which differ somewhat in the quantity of current employed. Since the utterly false statements of the proper method of cure made by Mallez and Trippier many years ago, these gentlemen claiming to cure stricture by burning out the diseased area, using the negative pole and a powerful current, another school has arisen claiming to cure stricture radically by the gentle and repeated use of very mild currents, also from the negative pole. The only trouble about the matter is that there is no unanimity of opinion as to how weak the current must be not to do harm.

I am now struggling with the most severe case of indurated traumatic stricture I have ever encountered in the pendulous urethra. The lump of indurated tissue is as large as the end of the thumb. The stricture was produced by electricity at the hands of a homœopath. The patient afterward visited a very distinguished advocate of electrolysis, who treated him for a time, deplored the sad result produced by the other electrician, and stated confidentially that no one could successfully treat stricture by electrolysis excepting himself.

Ström,²⁶ of Christiana, found experimentally that stricture was produced in the urethra of the rabbit after three or four weeks as the result of the effect of currents of from two to eight elements and sittings of five or ten minutes. The quantity of electricity in milliampères is not given. Robert Newman²⁷ publishes his second

hundred cases, in which he alleges that stricture has been radically cured by the use of electricity. Hutchinson²⁸ thinks that ten or a dozen cells such as a telegraph-operator in the country commonly uses are appropriate, the current being continued for a "few minutes," while Newman, the apostle of electrolysis in America, thinks that $2\frac{1}{2}$ to 5 milliamperes is the proper quantity. Newman asserts this year, as formerly, that all strictures are amenable to treatment by electrolysis, and he gives in pamphlet-form rules for the guidance of those who wish to use the method.

CATHETERISM.

Bayer,²⁹ of Pragne, sends a communication digesting the admirable article of Joseph Englisch³⁰ upon catheterism, which for thoroughness and the ground covered has probably no equal. It is manifestly not capable of satisfactory condensation, and is more exhaustive than novel.

John A. Stamps³¹ vouches for it that if hot water be injected through a catheter as the latter is being inserted, the water regurgitating will overcome the sensitiveness of the urethra so that the catheterism will be painless.

URINARY DISINFECTION.

Lucas Championnière³² calls attention to Guyon's appreciation of the value of urethral and vesical antiseptics, and to a demonstration by Terrier that the daily ingestion of from four to eight grammes of borax will cause sufficient boric acid to appear in the urine to disinfect it regularly and destroy germs.

PERNICIOUS URETHRAL FEVER.

Charles Monod³³ puts on record another case to swell the list. Internal urethrotomy of the deep urethra performed upon a man of forty with traumatic stricture. Violent chills in a few hours, and death during the course of the day. No autopsy.

R. W. Taylor communicated, at the first meeting of the American Association of Genito-Urinary Surgery, a typical case of that severe form of virulent septicaemia first alluded to by Larrey, and finally fully described by Trifaud, in 1883, under the name, "*Septicémie Gazeuse Foudroyante*." Taylor's case followed internal urethrotomy of the deep urethra performed by Bumstead. A gen-

eral rapid decomposition of the blood followed the operation, yielding an abundance of gas in the subcutaneous tissues so that the skin crackled under the finger, and the swollen and distorted patient promptly died in great pain with oppressive dyspnoea. Taylor's patient died 87 hours after the operation. Suppression occurred as soon as the emphysematous process began in the perineum. The patient was young and said to have been in good general condition before the operation, his urine being normal.

PROSTATE.

Several admirable articles have appeared in his own journal from the pen of Guyon³⁴ on the general maladies of the prostate. They are full of wise suggestions of a practical sort, as the writings of this master always are.

Bottini³⁵ and Robert Newman³⁶ (of New York) both claim to modify prostatic hypertrophy by the use of a galvano-cautery sound. The Italian instrument is a sound containing four canals,—two for the galvanic wire, and two for cold water to cool the instrument and limit caustic action. The instrument is introduced until prostatic resistance is encountered; then the current and the cold water are turned on and pressure made until the resistance is overcome. Bottini claims good results, and that the operation is but slightly painful.

Newman's instrument is a sound (number 18 French) carrying the conductors. The platinum-burner is exposed at a fenestra. Newman generally uses a Dawson battery. He finds the obstructing point, and applies the fenestra to it. The current is turned on only for an instant, and the sound withdrawn. He describes several methods of using the instrument, and claims success in treating a variety of conditions without detriment to the patient, and without danger.

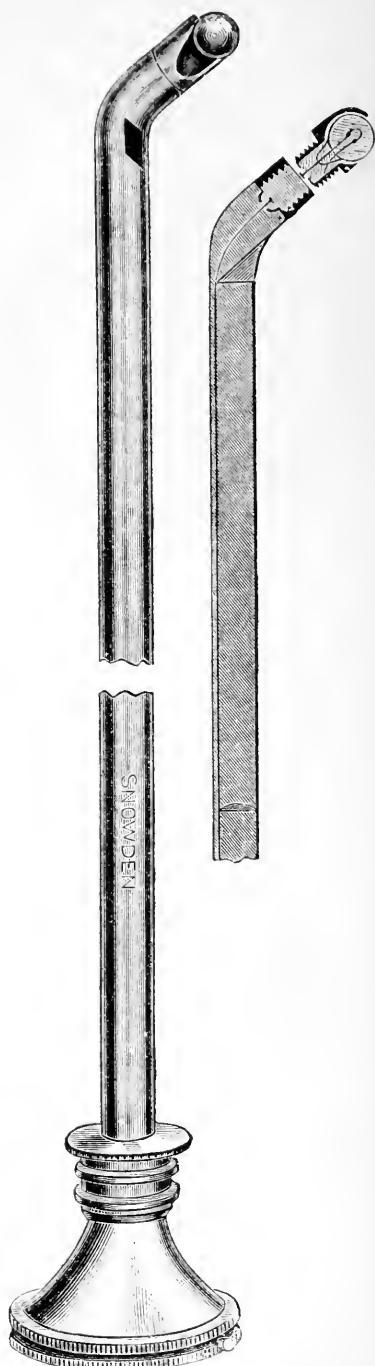
PROSTATECTOMY.

A. Ländlerer³⁷ on an occasion did what almost every surgeon who has had much to do with stone cases has done, either accidentally or by design. He cut an old man in the perineum for stone, and took away in the forceps besides the stone a median prostatic lobe. He relates that his patient was cured of his prostatic symptoms, as well as of those occasioned by the stone. Many surgeons have done this with good effect. Ländlerer proposes to

use this treatment in the future, and has operated upon the cadaver to perfect his method. It is hardly to be doubted that this means of removing prostatic overgrowth is not the best one. The future has more in store in this direction for suprapubic cystotomy. Dr. Lange,³⁸ of this city, removed a third lobe successfully by the suprapubic method. William T. Belfield,³⁹ of Chicago, has done the same upon a man of 73. One other case undertaken in a New York City hospital terminated fatally. I have had no personal opportunity of taking away a third lobe by suprapubic section, but the internal urethral orifice can be so clearly seen through the abdominal incision that there can be no question of the superior value of this method over that by perineal incision, if accuracy is aimed at. McGill⁴⁰ has recently reported to the London Clinical Society three successful cases of suprapubic prostatectomy. All the patients subsequently became able to urinate without a catheter.

THE BLADDER.

Cystoscopy.—Nitze⁴¹ claims that he has at last perfected his cystoscope and rendered it available for common use, stating that his new instrument is made only by P. Hartwig, of Berlin. The feature of this instrument, of which a figure is given herewith, is that the old illuminating white hot platinum point and necessary cool streams of water

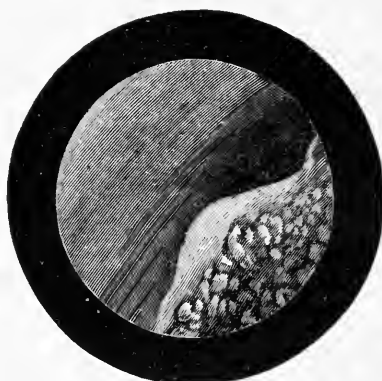


NITZE'S CYSTOSCOPE.—(Berl. Klin. Woch.)
FIG. 1.—Nitze's instrument, as made by Hartwig.
FIG. 2.—Section, showing the prism near the angle of the instrument, the lamp and its capsule.

are done away with by the substitution of a minute Edison lamp as the illuminating power; the instrument also has become much cheaper. The lamp is $6\frac{2}{3}$ mm. in diameter, and furnished for protection and reflecting purposes with a silver

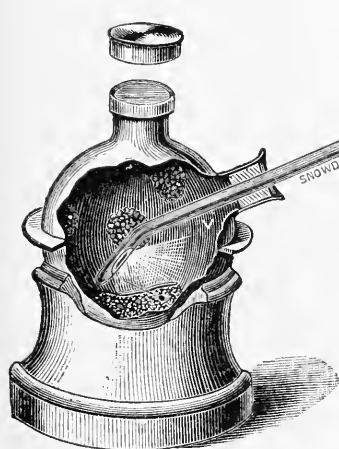


PAPILLARY GROWTH IN BLADDER.
(Berl. Klin. Woch.)



VILLOUS TUMOR OF BLADDER.
(Berl. Klin. Woch.)

capsule, which latter has an oval opening for the passage of the rays of light. Any galvano-caustic battery is capable of working the lamp. The whole apparatus is easily transported, and costs 65 marks. With this perfected instrument the visual field is a



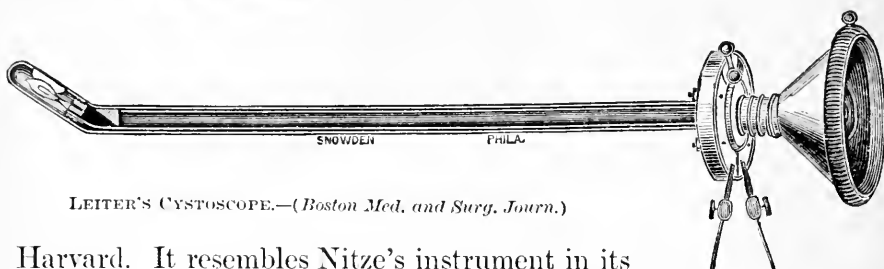
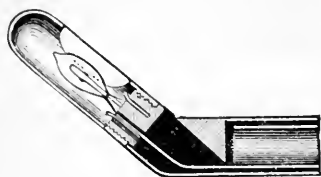
LEITER'S CYSTOSCOPE.—*Boston Med. and Surg. Journ.*

little larger than a silver dollar (as large as a silver five-mark piece). Nitze states that with it the entire inner surface of the bladder may be rapidly inspected and foreign bodies—tumors, ulcers, inflamed areas, encysted stones, etc.—readily and clearly seen. He refers with satisfaction to the published experience of others who have used his instrument, and gives two illustrations showing the visual field in two cases,—one a papillary growth, the

other a pedunculated villous tumor. In the latter instance the diagnosis was verified by an operation. He states that if an inflamed surface be touched by the instrument during exploration

it bleeds slightly, but the inspection may still go on. As the end of the tube is drawn away from the bladder-wall the field enlarges; as it approaches the mucous membrane the field contracts, but the part inspected becomes magnified in its details.

Bayer,⁴² of Prague, announces the new cystoscope made by Leiter, which was shown by Dittel to the Gesellschaft der Ärzte in Vienna. This instrument has been described in this country by O. K. Newell,⁴³ of



LEITER'S CYSTOSCOPE.—(*Boston Med. and Surg. Journ.*)

Harvard. It resembles Nitze's instrument in its essential particulars, is worked by a battery of Leiter's construction, and is patented.

EXSTROPHY OF THE BLADDER.

Trendelenburg's⁴⁴ posterior symphyseotomy, the separation of the sacro-iliac synchondrosis on both sides for the purpose of approximating the pubic bones in front by the aid of continued pressure sustained by a special apparatus, has been resorted to by himself a number of times, the results being just recorded at the Sixteenth Congress of German Surgeons. The operation is most likely to be successful if performed between the fourth and seventh years of life. Trendelenburg has succeeded in greatly narrowing the anterior gap between the bones, but he has not yet effected continence of urine by his operation. His cases are measurably successful. He cites also three cases of epispadias with incontinence, in which he has effected continence by simply narrowing the canal.

This posterior symphyseotomy of the Germans is not accepted by the French, nor yet the procedure of Sonnenburg, who extirpates the bladder, unites the ureters at a single central point, and adapts a urinal to them.

Zesas⁴⁵ reports a case of extrophy successfully treated by Sonnenburg's method, and describes the shield and urinal worn,—an instrument very similar to Vrolick's, the one generally in use in this country, and which serves perfectly well for cases which have never been operated upon.

PNEUMATURIA.

Charles Tisné⁴⁶ reports a case in which gaseous formation occurred in the bladder in connection with strongly ammoniacal urine and a large purulent collection about the left kidney. In this case there was no sugar in the urine, as there had been in Guiard's cases referred to.

In several cases reported by myself, not noted by Tisné, there was no suspicion of diabetes.

LOCAL TREATMENT OF THE BLADDER.

Utzmann,⁴⁷ in chronic inflammatory conditions, washes out the sensitive bladder with warm water containing a little tincture of opium, one-quarter per cent. of cocaine, one-half per cent. of resorcin, or one-sixth per cent. of carbolic acid. When the urine is ammoniacal he employs one-tenth per cent. of permanganate of potash or three drops of nitrite of amyl in five hundred grammes of water. In phosphaturia one-tenth per cent. of salicylic acid, a 1 in 10,000 solution of corrosive sublimate when bacteria are present; for hemorrhage one-tenth to one-half per cent. of nitrate of silver in cold water, or fifty or sixty drops of the tincture of the sesquichloride of iron in the quart.

TUBERCULAR CYSTITIS.

S. Clado⁴⁸ concludes, from an anatomical study of the tubercular lesion in the bladder, that the first deposit occurs in the shape of a minute superficial granule, and that even some of the smallest ulcers do not penetrate the entire thickness of the mucous membrane; that the habitual distribution of the tubercular lesion along the trigone and base of the bladder converging toward the neck indicates that the infection is usually due to the kidneys, and has not traveled up the urethra. He thinks therefore that a rational treatment for vesical tuberculosis when there is no prostatoseminal infection is to open the bladder above the pubis, scrape

the infected parts with a curette, and cauterize afterward both these parts and the neighborhood. He asserts that Guyon has obtained in one case by this method "a cure which seems complete." Jacques L. Reverdin¹⁹ operated on a man of 20 with tubercular cystitis and double tubercular epididymitis by this method, with the effect of arresting hæmaturia and greatly relieving the patient. Reverdin states that in Guyon's case, which is the only one he knows, there was no ulceration and no *raclage*. The bladder was opened above the pubis, the neck dilated, and iodoformed oil applied, yet the cure persisted eighteen months later. Reverdin's patient grew fat and vigorous, his urine cleared up, and his condition became and remained satisfactory nine months later, when the observation was recorded. On the whole the operation was considered to have produced satisfactory results, although the suprapubic wound was still patulous.

RUPTURE OF THE BLADDER.

This subject has received a remarkable impetus during last year on account of MacCormac's cases and those reported from other sources.

E. Ullmann⁵⁰ has made an exhaustive study of the subject of experimental, surgical, and accidental rupture of the bladder. His results experimentally were similar to those obtained by Dittel in 1886, but the conditions were different in that he left the abdominal wall intact, while Dittel opened it. He found that bladders varied, some (notably those in suppuration) rupturing after distension with three hundred and sixty c. c. of fluid, one only after two thousand seven hundred. Dittel found five thousand necessary in one case. There is no fixed point of rupture, which may be intra or extraperitoneal. The mucous coat tears least, the muscular more, the peritoneal most. When the rectum is distended with the colpeurynter rupture always occurs in the posterior wall of the bladder.

Ullmann's Table I. is notably interesting at the present day, in that it gives the nine cases so far reported of rupture of the bladder caused by the injection of fluid preparatory to suprapubic operation. Among the nine he leaves out one reported by Verneuil, where rupture occurred after injecting 125 c. c., because a lack of details makes it impossible for him to classify it. Of the

remaining eight (by Weinlechner two cases, Momod, Perier, Guyon, Dittel, Ullmann, two cases from Albert's Clinique) the rupture took place after injecting respectively 150, 250, 200, 200, 100, 200, 180, 400 c. c. of fluid. The rupture was extraperitoneal seven times. In five the high operation was performed with three recoveries,—Monod 1, Ullmann 2. In Perier's case recovery took place under drainage. Guyon's case died, a catheter being tied into the urethra, and Dittel's case died after the high operation.

This table shows the mortality after this sort of rupture to be less than that recorded after accidental rupture. In Table 2, twenty-four cases are tabulated from 1882 to date (June, 1887). Ten were extraperitoneal, 14 intraperitoneal; of the former two were cut above the pubis and recovered, two had the catheter tied in, one recovered, one died, one was drained through the peritoneum and recovered, three had nothing done and died, one was intermittently catheterized and died, one recovered, particulars not noted.

Of the fourteen intraperitoneal cases, one (Sonnenburg) had the peritoneum opened after forty-eight hours (bladder not sutured) and died. One (Hofmokl) laparotomy with vesical suture recovered, ten had nothing done and died, two were intermittently catheterized and died. The deduction is obvious. Suprapubic exploration must become the surgical rule for all cases of vesical rupture, with laparotomy and vesical peritoneal suture if the rupture proves to be intraperitoneal.

Hofmokl,⁵¹ of Vienna, operated by laparotomy and vesical suture in what seems to be the pioneer successful case by this method. The rupture was complicated by a fracture of the symphysis, as well as other injuries. This case does not seem to have received thus far in medical literature the credit which belongs to it. Of the three cases which had been operated upon previously by laparotomy that of Walter recovered, there being no suture of the bladder and a catheter being tied in. The other two cases (Willet and Heath) both died.

Sir William MacCormac's⁵² two cases of successful laparotomy with vesical suture have attracted universal attention throughout the surgical world. The operation was performed fifteen and twenty-four hours respectively after the injury. Silk suture was

employed for the bladder (Lambert method). The peritoneal cavity was drained with a glass tube, and a catheter tied into the bladder through the urethra. Both patients were fat, heavy men. The peritoneum was irrigated with one per cent. boric acid solution.

Mr. T. Holmes⁵³ adds another successful case in which he employed eight silk sutures within the peritoneum. No peritoneal drainage was employed. In Mr. Teale's⁵⁴ case six silk sutures were used, and the perineum was also incised, a rubber tube being left in for drainage. The patient died from hemorrhage of the perineal wound, which plugging failed to arrest.

Mr. Walsham⁵⁵ operated successfully in St. Bartholomew's Hospital, March, 1887, the intraperitoneal rent being an inch and a half long. J. M. Fox,⁵⁶ of Philadelphia, operated unsuccessfully by laparotomy with intraperitoneal suture (fifteen, catgut; autopsy showing a closed bladder), and I have operated in Bellevue Hospital in the autumn of 1887, also unsuccessfully. Nine sutures of silk were applied. Autopsy in this case showed the vesical wound to be water-tight.

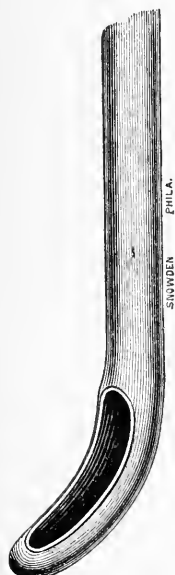
The possibility of the successful treatment of intraperitoneal rupture of the bladder without operation has been for the first time absolutely demonstrated during the past year. Henry Morris⁵⁷ records a case in which the bladder was first ruptured in 1879. The patient recovered in the Middlesex Hospital under opium and a catheter tied into the bladder through the urethra. On August 4, 1886, he was again brought to the hospital with a ruptured bladder, and died without operation. Autopsy showed the rupture of the bladder to have been due to giving way of the old cicatrix. It was intraperitoneal. In the same line must be chronicled the case reported by Drs. Benham and Greig Smith.⁵⁸ An imbecile pushed an umbrella-whalebone up the urethra into his bladder. Two years later he died of Bright's disease, and autopsy disclosed the fact that the whalebone had perforated the bladder-wall. It was found in place partly within the bladder, covered with phosphates, and partly in the peritoneal cavity. During life the patient had not exhibited either vesical or peritoneal symptoms.

C. K. Briddon⁵⁹ has recorded two extraperitoneal ruptures of the bladder in which a drainage-tube was introduced above the pubis into the prevesical space. In one case a silver catheter was

tied in through the urethra, in the other peritoneal cystotomy was performed. The first recovered, the last did not, presumably on account of other intraperitoneal injuries.

REMOVAL OF FOREIGN BODIES.

Reginald Harrison⁶⁰ calls attention to the value of a large-eyed evacuating catheter attached to a rubber bottle, like any of the washing bottles used in litholapaxy. The suction of the returning stream of water draws the foreign body into the wide opening in the direction of its long axis, if at all, and in this way, more safely than by the use of the lithotrite, Harrison has been able to remove various foreign bodies from the bladder. He mentions especially a pig's bristle five inches long, coated with phosphates, and three inches of a No. 6 gumelastic bougie. He uses the same instrument as a scoop with which to scrape away incrustated phosphates and wash them out of the bladder.



HARRISON'S EVACUATING CATHETER.
(*London Lancet.*)

De Forest Willard,⁶¹ of Philadelphia, advocates a litholapaxy evacuator with large tube open at both ends for the removal of foreign bodies from the bladder, and showed to the Philadelphia County Medical Society a number of objects so removed. He advocates the use of the same instrument for removing urethral foreign bodies, compressing the canal behind the object, capping the latter with the tube, flushing the urethra, and suddenly applying suction.

COCAINE ANÆSTHESIA.

Cocaine has scored a few victories in genito-urinary surgery during the past year. A. H. Smith, of New York, being called to relieve retention in a man having tight stricture in the membranous urethra, found that a No. 4 catheter, the smallest he had with him, could not be made to pass; he therefore introduced a large catheter down to the seat of obstruction and injected a few drops of a 4 per cent. solution of cocaine hydrochlorate. In a few minutes the patient was able to urinate as usual, and quickly emptied his bladder. This effort is worthy of imitation in suitable cases.

Horovitz⁶² claims to have had excellent success (and adduces two instances in support) in cases of chronic catarrh with hypertrophied and contracted bladder by injecting at night, when the patient retires, twenty to thirty drachms of warm water containing 30 to 70 c. c. of cocaine hydrochlorate. The bladder loses its irritability, and the accumulating urine gradually produces distension. The dose of cocaine may be lessened from night to night. There is no other evidence of general absorption than the taste of cocaine in the mouth. The usual local and general treatment is not interfered with by the cocaine injections.

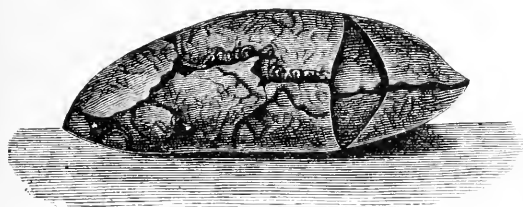
W. T. Belfield,⁶³ of Chicago, reports the case of a healthy man of twenty-eight, upon whom he performed internal urethrotomy for slight stricture three-quarters of an inch from the meatus. At each reintroduction of the sound about two drachms of a 4 per cent. solution of cocaine were injected into the urethra. On the ninth day the patient complained after the injection of dizziness, and in three or four minutes was dead. Nothing was found on autopsy except enormously congested kidneys, so that the cocaine injection was probably a coincidence of death from uræmia rather than a cause of the accident.

Dubuc⁶⁴ gives the results of his experience in the use of cocaine local anæsthesia for litholapaxy (the dose and method), basing his conclusions upon five patients, most of whom had multiple operations. He first anæsthetizes the urethra and prostate with a few drops of the solution. The bladder, he thinks, ought to receive at least one ounce, and this quantity he considers ample. As for the strength of the solution, he believes it should be graded according to the condition of the mucous membrane. When the latter is eroded, as in the case of chronic catarrh, notably with phosphatic stone, he thinks that a 4 per cent. or 5 per cent. solution should be used, preferably 5 per cent. When the urine is clear, the stone acid, and the mucous membrane not eroded, he prefers a 10 per cent. solution. He employed a 15 per cent. solution in one case, injecting 5.25 grammes in 35 grammes of water, and in six minutes had nausea and faintness, causing him to evacuate the bladder at once and proceed with his operation under a boric acid solution. The advantage claimed for cocaine is, that while it more or less completely abolishes sensibility, it also prevents vesical spasm (measurably) during the operation. Only

short operations for small stones are considered by Dubuc to be suitable for removal under cocaine anæsthesia. Suender,⁶⁵ of Madrid, reports some case of stone successfully extracted by lithotripsy under cocaine anæsthesia, a 5 per cent. solution being left 25 minutes in the bladder.

A number of writers (Burdet, Dubuc,⁶⁶ Perier,⁶⁷ Berger⁶⁸) have advocated the use of a cocaine injection into the cavity of the tunica vaginalis as a preparatory step to the injection of iodine for the radical cure of hydrocele. A moderate amount of a one per cent. solution is usually employed, and its effect in reducing the pain of the final injection of iodine is said to be considerable.

URINARY CALCULUS.



URETHRAL CALCULUS.—(*London Lancet.*)

An exceptionally large urethral calculus was removed by Mr. Brown,⁶⁹ of Leeds, the actual size of which is shown in the accompanying cut. It occupied the extreme anterior end of the urethra, where it had been for a number of years, not materially interfering with the functions of the organ, sexual or urinary. It weighed 265 grains.

An apparent improvement in the apparatus for maintaining the lithotomy position has been described by Thomas B. McBride.⁷⁰ It is quite similar to one which has been for several years in general use, but apparently simpler. It is a piece of hard wood (preferably ash or hickory) three-eighths of an inch thick, one inch wide, 36 inches long, bent at each end in a semicircle six inches in diameter, or a semi-



LITHOTOMY SUPPORT.—(*N. Y. Med. Journ.*)

bent at each end in a semicircle six inches in diameter, or a semi-

circumference of $10\frac{1}{2}$ inches, leaving the shaft 15 inches long between the semicircles, and making the finished instrument 27 inches long. To the shaft two inches from each end a buckle is attached, and a band of webbing completes the apparatus. The thighs are put into the semicircle and the band around the neck is fastened to the buckle.

On the general subject of urinary calculi Alf. Pousson⁷¹ has proposed a new classification. Dittel is reported by Bayer⁷² to have removed from a man sixty-five years old twenty-six large stones by a perineal operation.

Schmitz⁷³ has published his statistics of the result of operations for vesical calculus in children during the past thirteen years (ninety-five operations):—

41 Suprapubic,	. . . . .	15 deaths.
29 Perineal,	. . . . .	7 deaths.
18 Lithotrixy,	. . . . .	2 deaths.
7 Perineal lithotrixy,	. . . . .	Result not stated.

This showing can hardly prove a cause for congratulation to those who advocate the high operation for the removal of stone in children.

Litholapaxy, on the other hand, in relation to its applicability to children has received further encouragement from the reports made during the year in India by Surgeon-Major D. O'Connell Raye⁷⁴ and S. J. Goldsmith,⁷⁵ Surgeon-Major.

Walsham⁷⁶ has also reported some successful cases in England. Raye's three boys were aged 5, $5\frac{1}{2}$, and 2 years. The stones weighed respectively 30, 20, and 63 grains, and the boys left the hospital well in 5, 4, and 30 days.

Goldsmith's Bombay cases numbered 22, with recovery in every case. Three cases are tabulated at the age of 3. The table also contains 3 females. The oldest child operated upon was 11. The smallest stone weighed 30 grains when dry, the largest 220. Many of the cases were detained in the hospital only two days after the operation. The longest detention after an operation of one sitting was 12 days. In an operation of two sittings the patient remained in the hospital 17 days.

These cases, added to those already so well known of Surgeon-Major Keegan, of Indore, establish litholapaxy on the firmest possible basis as to its applicability to children. The idea of attempting to test it on the child seems to have originated in India

with Deputy-Surgeon-General T. Beaumont, of Indore. Keegan carried out his idea and Churchill⁷⁷ has published his experience in book form.

Thompson⁷⁸ has slightly modified his washing bottle by altering the form of the glass receiver, doing away with the necessity for a leather washer, making the instrument more durable, and suitable for hot climates.

W. J. Walsham⁷⁹ reports 4 successful personal cases of litholapaxy upon male children in England, and gives a comparative digest of the results of litholapaxy in children when compared with that attained by the suprapubic operation at the same time of life. The comparison is overwhelmingly in favor of litholapaxy. His basis of comparison is the 9 cases of litholapaxy in boys performed in England since February 26, 1885, by Walsham, Willett, Utholl, Cadge, and Morgan, and 12 cases of suprapubic operation reported in England since August 2, 1886, by various operators, in the *Lancet* and *British Medical Journal*. The limits in size of stone removed by litholapaxy were $7\frac{1}{2}$ and 50 grains; the limits in age 3 years and 3 months and 11 years. All recovered. The limits in time of treatment, 3 days and 1 week.

Of the 12 suprapubic cases the limits in size of stone were 20 grains and 186 grains. (Several are tabled simply as "small.") The limits in age were 3 and 14 years. One died. The limits in time of treatment were for the shortest case "over three weeks," and "months before cicatrization was complete" in the longest.

SUPRAPUBIC CYSTOTOMY.

No subject in the range of genito-urinary research has received of late so much attention as suprapubic cystotomy. For one purpose or another it has been generally tested in all countries. Since the impetus given to the modern operation by Peterson and his rectal colpeurynter, an occasional surgeon, still ripe but crystallized too soon, has declined to adopt or test the new procedure on general grounds. Others deny the advantage of rectal inflation on account of alleged danger. Others again, mostly surgeons not yet ripe, announce that the new method must supercede all others, and apply it in every case, to the great detriment of their patients, especially if they be children, and to the discredit of the operation, statistically speaking.

A majority of the most mature judgments that have been expressed in the various countries relative to this operation approve rectal distension, and agree to confine the operation to cases of vesical tumor, certain foreign bodies, large stone, and smaller stone where litholapaxy is not admissible, and in which there is no indication to incise the perineum (stricture). They agree to use it also for prostatectomy, encysted stone, occasionally for vesical exploration, and in some cases for drainage. They deny its general applicability for stone, especially in the case of children.

Special cases and sets of cases of suprapubic cystotomy have appeared at the hands of various authors in various parts of the world. Dulles,⁸⁰ of Philadelphia, has published an excellent historical sketch of the operation.

Sir William MacCormac,⁸¹ Marc Sée,⁸² F. D. Guiard,⁸³ and Clado and Nourri,⁸⁴ pupils of Guyon (the latter in regard to Guyon's method of dressing after operation) have all contributed admirable articles upon the general subject.

Eugene Boeckel,⁸⁵ of Strasburg, has endeavored to summarize the indications for suprapubic cystotomy. He consigns to the suprapubic operation calculi two inches and more in diameter in an adult, one inch and a fifth and over in a child. He thinks that any stone not fit for lithotripsy in the old man should be removed by the high operation rather than through the perineum, since he dreads a wound of the large prostate, and fears the damage liable to be done by bruising, etc. This question, however, cannot be decided at once in so general a manner, since the problem involves the possibility of lowering the floor of the prostate and cutting through a membranous urethra contracted by prolonged spasm. Against this must be placed the superior facility for cutting away offensive median hypertrophy which is offered by the suprapubic incision. Drainage is effected by both operations, but possibly in a more satisfactory manner above the pubis.

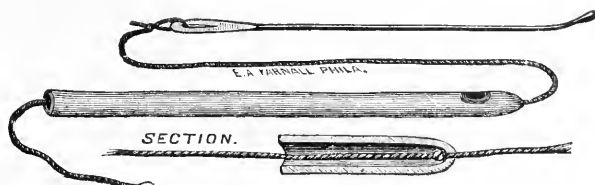
Boeckel makes the general statement that when a stone is large enough to be appreciated by bimanual palpation the case is more suitable for suprapubic than for perineal section. This rule he applies to the child. In a general way he concludes that up to three years it is better to extract a stone two centimetres in diameter by the perineum; eight years, three centimetres; twelve years, four centimetres. Stones larger than these, in his opinion, call for

the high operation. Bœckel cites only three statistics of the high operation, each comprising only a few cases. His own mortality is 44.4 per cent., Guyon's mortality is 47.3 per cent., Dittel's mortality 55.5 per cent. Bœckel excuses these serious figures by the well-known circumstance that usually only bad cases come to operation by the suprapubic method. He has devised a spoon-shaped instrument for extracting the stone, preferring it to forceps in the suprapubic operation. He adopts Perrier's drainage, and discards vesical suture entirely.

John Croft⁸⁶ successfully removed two calculi weighing together over four ounces by the suprapubic operation from a feeble old man of 72. The interest in the operation is due to the fact that this is the first suprapubic section performed at St. Thomas' Hospital since Cheselden gave up the operation,—a century and a quarter ago. Cheselden then said that "he would not have left the high way but for the hopes he had of a better, being well assured that it might hereafter be practiced with greater success."

My personal experience up to May, 1887, with the suprapubic operation has been recorded,⁸⁷ and in the main corresponds with the general statement I have already made. I have found, especially in cases where there is not likely to be much hemorrhage, and particularly where the bladder is suppurating freely, that if vesical suture is to be attempted, perineal drainage makes it more likely to succeed, and is better, in my opinion, than tying a catheter into the bladder through the urethra.

The objection made to perineal drainage in suprapubic operations is that it complicates one operation by adding another. This objection I have endeavored to minimize by a device for passing



KEYES' DEVICE FOR PASSING DRAINAGE-TUBE.

the drainage-tube through the smallest possible incision. A long probe is passed through a small perineal puncture made upon a broadly grooved median staff. This incision is not made large

enough to admit the finger. The probe is passed along the groove of the staff into the bladder. There it is received by the fingers of the surgeon and carried out through the suprapubic wound. A string pulls the large soft-rubber catheter (size 30 French) into the bladder by the aid of the knot tied so as to catch within its tip. The catheter closely fits the perineal wound and the urethral



KEYES' RETRACTOR.

opening. This drainage works admirably, except in cases where there is considerable hemorrhage. I have also found much advantage when prolonged inspection of the bladder is necessary from the use of a special retractor to hold up the upper angle of the bladder-wound, while suspending threads and ordinary retractors separate the abdominal muscles and lips of the wound.

Sir Henry Thompson⁸⁸ is enthusiastic in praising the result of suprapubic drainage in the following case: A gentleman of 64, with large prostate, who passed all his urine through a catheter introduced 16 times in 24 hours, was operated upon in April, 1885, by lithotrity, 124 grains of stone being removed. So much relief followed that the catheter had now to be introduced only eight times in 24 hours. In November, 1885, the perineum was opened and six calculi removed from a cyst in the bladder. Relief was only partial. In April, 1886, Sir Henry opened the bladder above the pubis, found an enormous prostate and the bladder coated with phosphates.

The wound healed kindly. A silver tube and plate were adjusted capable of admitting a No. 20 English scale silk catheter. To this an urinal was attached, and then the patient resumed his health and comfort, walking two miles and urinating without distress through the tube. The urine was kept pure and sweet by daily washings of the bladder, and sleep was undisturbed. At the time of reading of the paper the patient had been urinating through the new opening for a year and a half, and continued in excellent health. In his general remarks as to the number of

times he had performed this operation for suprapubic drainage with the idea of leaving in a permanent tube, Sir Henry mentions a number of operations of his own. The late Dr. Van Buren,⁸⁹ of New York, did this operation first in 1863, a long silver tube, double like a trachetomy-tube, having been introduced by him above the pubis of the patient for permanent drainage, and worn many months, until death.

TUMOR IN THE BLADDER.

Lucas Championnière⁹⁰ speaks of the admirable work being done in France by Guyon⁹¹ relative to vesical tumors, and to the published essays by the latter setting forth his views. Voituriez⁹² has contributed an essay on the treatment of tumors.

Guyon⁹³ records a case of vesical epithelioma about one centimetre in diameter, situated on the right lateral surface of the bladder near the bas-fond. The operation was suprapubic, and the little tumor removed with a knife by undermining it circumferentially, so that the wound left was beveled inward toward the centre of the base of the tumor in all directions. In doing this Guyon claims to have been greatly aided by the fact established by the researches of his pupil, Clado, who discovered that vesical neoplasms at a certain stage of their development are underlaid with a fatty pellicle of new formation differing in nature from the malignant growth, and forming an isolating wall between the tumor and the healthy parts. This fatty pellicle was demonstrated by dissection during the operation, which made it possible more readily to remove the entire morbid growth. Six points of catgut suture were applied and left in the bladder. The patient recovered.

Guyon alludes to two other recorded cases of resection of the bladder,—the case of Sonnenberg, of Berlin, who resected two-thirds of the bladder, opening the peritoneum; and the case of Antal, of Buda-Pesth, who resected a part of the anterior wall of the bladder and did not open the peritoneum. In both these instances the resection was made from without inward. Guyon does not refer to the case reported by Lange, of New York, who resected a portion of the base of the bladder (not going through all the coats) for a small epithelioma, sewing up the wound afterward in much the same manner as recorded by Guyon.

THE URETER.

Tuchmann⁹¹ (physician to the German Hospital in London) has devised an instrument with which to compress the ureter within the bladder in order to be able to examine the urine flowing from the other kidney. It is like a thin, long-jawed lithotrite, with a tubular arrangement through which urine may flow away. The instrument does not look as if its application could be easy in ordinary hands, whatever its inventor may be able to do with it.

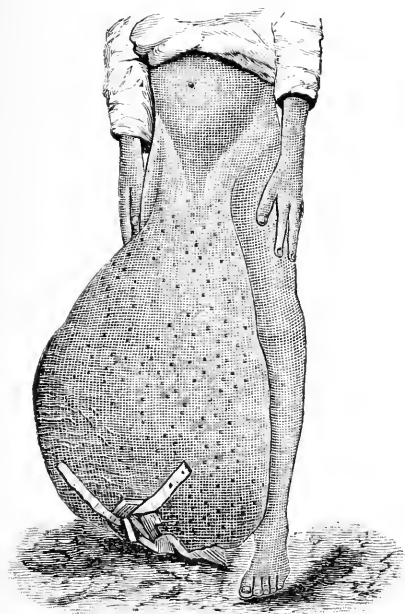
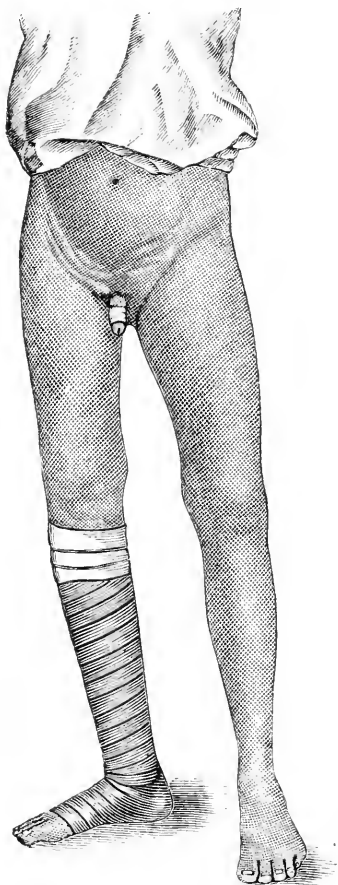
Prof. Novaro, of Sienna, read before the Italian Surgical Society at Genoa the result of an experimental operation performed upon a dog for the transplantation of the ureters into the rectum. The dog was living and well. This operation had already been undertaken without complete success by Glück and Zeller, of Berlin. Bardenhaur, of Cologne, succeeded with one ureter. Navaro thinks that in cancerous tumors of the bladder the ureters ought first to be transplanted into the rectum, the total extirpation of the bladder being undertaken as a second operation.

THE SCROTUM.

Karewski,⁹⁶ of Berlin, refers to Paoli's two published cases of false urethral pouches, and to Paul Satre's⁹⁷ collation of six cases in 1874, and describes his own case, which he calls urinary cyst in the scrotum. The patient ten years before had had gonorrhœa, then stricture. Three years previously he had suffered from perineal abscess, not followed by fistula; then the scrotum swelled and was tapped as for hydrocele, yielding a clear fluid. Tapping was twice repeated. There was no difficulty in urination during all this period. The scrotum was as large as the fist, and the testicles could be made out lying freely in its cavity. Pressure on the tumor caused clear urine to flow at the urethral orifice, and a band could be felt leading from the back part of the tumor to the prostatic region. The natural therapeutical indication in a case like this is to excise the cyst and close the urethral fistula. Karewski thought it best to use an irritating injection. He employed corrosive sublimate 1 in 1000 and reduced the size of the cyst, but did not, apparently, cure it. He finally says: "Unser Fall scheint auf diesem Wege zur Heilung zu Kommen."

ELEPHANTOID SCROTUM.

W. R. Browne,⁹⁸ Surgeon-Major of the General Hospital in Madras, reports, with plates, a severe case of this malady which had lasted six years in a butcher of 35. The scrotum measured six feet six and a half inches in horizontal, six feet ten inches in

ELEPHANTOID SCROTUM.—(*Indian Medical Gaz.*)APPEARANCE OF PARTS AFTER RECOVERY.—(*Indian Medical Gaz.*)

vertical, circumference. The penis was wholly imbedded, the urine passing through an opening at two feet five and a half inches from the pubis. The patient controlled his bladder perfectly, but was unable to walk on account of the size of the tumor. The penis and testicles were dissected out in one hour and twenty minutes, and the tumor, after removal and drainage, weighed 124 $\frac{3}{4}$ lbs. But little blood was lost, on account of an elastic cord which was tied around the neck of the tumor and secured by straps to a leather waist-belt. Recovery was prompt.

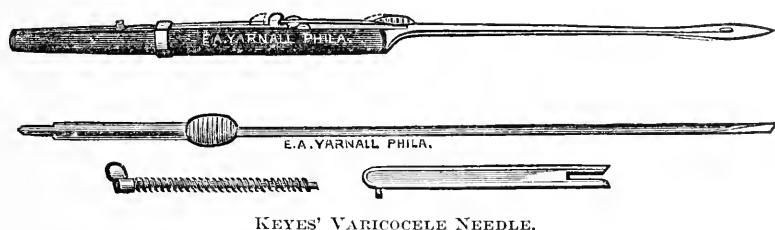
VARICOCELE.

The best method of curing that moderate but sometimes annoying malady, varicocele, does not yet seem to have been established clearly in the minds of the profession, the contest lying between curtailment of the scrotum, antiseptic excision of the veins, and subcutaneous ligature. The first two methods are more strongly advocated abroad, the last at home. Lucas Championnière⁹⁹ speaking of the interest which attaches to the matter in France, mentions Horteloup's method and clamp, and emphasizes the fact that he removes the scrotum without a clamp.

Horteloup¹⁰⁰ has devised a new scrotal clamp, and Le Dentu¹⁰¹ another, the latter publishing statistics of results upon eleven cases, and the former attaching great weight to the excision of the retrodeferential venus plexus as a part of his operation. The French do not yet seem to have any idea of the simplicity and value of subcutaneous ligature with silk, an operation suitable, I believe, to all cases of varicocele.

I have been endeavoring to perfect this operation for several years past, and have now operated upon over 50 cases. The first ligated with catgut failed; this substance is not suitable. All those tied with silk have succeeded; the silk remains and becomes encysted. I have felt it as a small solid lump, perfectly painless, a year and a half after its introduction. I have never had any complication in the way of pus or unwonted inflammatory action. I have on several occasions ligated the entire cord except the seminal duct with heavy silk, passing one ligature to the outer side of the vas deferens, another to its inner side. I have never seen atrophy or other injury to the testicle occur. I have often had occasion to ligate the retrodeferential plexus with silk, subcutaneously, low down. Coarse, twisted Chinese silk is prepared by boiling, and preserved indefinitely ready for use in simple alcohol. The instruments are carbolyzed, the scrotum and the operator's hands repeatedly moistened with a bichloride solution one in one thousand. The needle, which I believe is finally perfect, is a straight one in a handle, the eye being opened and shut by a mechanism like that employed in Reverdin's needle. A spring covered by a plate in the handle keeps the shaft pushed forward and the eye of the needle permanently closed, unless it is held

open by a finger upon the sliding button in the handle. The needle is introduced charged with silk. The silk is taken from the eye, the naked needle partly withdrawn and carried around the veins to emerge at the original posterior puncture, when the eye is opened, the silk reintroduced, and the whole withdrawn. The slight point of included dartos at the posterior point of puncture is now pulled away,—all under bichloride irrigation,—the silk



very tightly tied, cut short, and the knot allowed to sink within the scrotum. The patient is confined to bed not less than 3, not more than 8, days. I sent one case home to the country in two and a half days. No medicine is required but a laxative, sometimes an anodyne. The testicle must be supported, no other dressing being required. The inflammatory swelling sometimes reaches the size of an English walnut.

THE EPIDIDYMIS.

A general article on inflammation of the epididymis has appeared from the pen of Prof. Neumann,¹⁰² of Vienna, covering the entire subject; and Englisch,¹⁰³ of the same city, has given his views upon an inflammation of the epididymis and chord caused by abdominal muscular pressure, with contraction of the cremaster. He adduces some cases, and refers to other observations by the French. The prognosis is good, suppuration uncommon.

THE TESTICLE.

Ivanoff¹⁰⁴ chronicles the rather unusual circumstance that a man of 45 during an altercation received a violent blow on the testicle; he cried out, became insensible, and died in a few minutes. A slight cerebral hyperæmia was the only lesion found on autopsy.

Terrillon¹⁰⁵ reports four cases of neuralgia of the testicle, in

three of which Charcot had been associated with him. All the patients had intense neuralgia of the testicle, in connection with other signs of hysteria, such as cutaneous hemianæsthesia, diminution of the visual field, anæsthesia of the pharynx, diminution of smell, taste, neuralgic points, etc. One of these was a boy of 12. In the discussion which followed it was very justly claimed that it was wrong to attach neuralgia of the testicle to hysteria. Although undoubtedly it might occur as a symptom of hysteria, its existence without the latter malady has been too well established to admit of doubt.

HYDROCELE.

The subject of hydrocele only seems to attract attention from European writers as regards statistics and a description of the relative value of the old methods,—iodine injection and antiseptic excision of the tunica vaginalis. Upon these heads a number of articles have appeared, but as they do not decide the question, and advance nothing novel of material moment, it must suffice simply to refer to the fact that Perrier,¹⁰⁶ Dubuc,¹⁰⁷ Routier,¹⁰⁸ and Reclus¹⁰⁹ have contributed valuable articles upon the subject. The value of the previous injection of cocaine in stilling the pain of the iodine injection has been already alluded to under its proper head.

It is curious to observe how little is known in Europe, apparently, of the great value of the use of absolutely pure carbolic acid in injection for the radical cure of hydrocele,—a method due to Levis, of Philadelphia, and one as certain to cure simple hydrocele as any with which I am familiar, and that too with practically no pain in a majority of instances. The method is reasonably well known, as Levis has written about it, and I have published a modification which I believe simplifies the operative method; yet even in America a fear seems to be entertained that pure carbolic acid injected into the tunica vaginalis may do harm, and a number of cases are reported where various dilutions of the drug have been substituted. Such changes only increase the patient's pain (which with the pure acid is sometimes absolutely wanting) and jeopardize the success of the operation.

Henry Laning¹¹⁰ reports from Barnabas Hospital, Osaka, Japan, an exceptionally large hydrocele, yielding on tapping 102 ounces of brown fluid.

Dr. Wright¹¹¹ records three cases of hydrocele in the round

ligament of the female; the cysts were in the groin (in one case there were two), yielded clear serum on aspiration, and were cured either by repeated tapping or by scarifying the inside of the cyst with the needle which evacuated its contents.

ORCHITIS.

Malarial orchitis has been the subject of several communications to medical literature during 1887.

Magnani¹¹² reported several cases to the 12th Italian Congress at Pavia. The testicle (generally the left) swelled during malarial fever and recovered under the use of quinine.

Bazzano¹¹³ has seen two similar cases, but quinine failed to influence them favorably.

Schmit¹¹⁴ announces a case of double malarial orchitis which he saw upon a soldier in Tunis who had been exposed to a wetting,—had no gonorrhœa and no mumps. After chill and fever the right testicle swelled painfully, the epididymis remaining unimplicated. Forty-eight hours later another chill and fever. Forty-eight hours another milder one. All this under the sulphate of quinine. A similar chill and fever later on announced that the left testicle was involved. It swelled like the right. A month afterward both testicles were manifestly atrophied to half their normal volume, and were still sensitive to pressure. Schmit alludes to the observation of Girard and those of Bertholon, the first upon malarial manifestations in the genito-urinary organs, the second upon primitive malarial orchitis.

It is rather extraordinary that in a country so full of ordinary malaria as America, disease of the testicles due to this cause should not have shown itself, if such a malady really exists. It seems wiser to wait for further confirmation of the matter before adopting a conclusion.

TUMORS OF THE TESTICLE.

An excellent article upon the classification of these tumors has appeared from the pens of Charles Monod and G. Arthaud.¹¹⁵ A new instance of that rare form of tumor, liomyoma of the epididymis, has been communicated by Condamini,¹¹⁶ who chronicles the case removed by Professor Poncet, of Lyons. The interest attaching to it lies in the fact that thus far only three such

tumors of the testicle have been reported,—one by Rindfleisch and two by Héricourt.

TUBERCLE OF THE TESTIS.

The contest concerning tubercular disease in the testicle as elsewhere has been between those who consider any local focus of tubercle dangerous to the individual as a centre from which infection may spread, and therefore worthy of destruction at whatever sacrifice, and others who believe that the local expression is only one symptom of a general malady.

My own impression is that castration for tubercular testis is too often performed. I have frequently seen the disease get well, and believe that a sacrifice of the organ should be held as a last resource, and not brought into play until all other measures have failed.

Finckh¹¹⁷ publishes statistics of 29 castrations for tubercle in the *Tübingen Clinique*, the greatest length of observation of a patient after operation being thirty years, the shortest time one year. Out of eight cases of double castration, in five the vas deferens was healthy on both sides, in two it was diseased on one side. In one case, however, both cords were involved and the disease had extended within the pelvis so that a part of the tubercular tissue was left; yet the patient lived 23 years, which would go to controvert Finckh's first proposition that no partial extirpation is allowable. Further, he states that in the case of seven patients diseased tissue was left in the cord, yet in none of them was there recurrence. Finckh does not refer to cases of spontaneous recovery without operation, and overlooks the cases cited by Reclus, in which the prostate as well as the testicle was involved; yet the patients recovered, as proved by autopsy. Finckh's cases range in age from eight to sixty-three years. Six died subsequently of tuberculosis without local recurrence. This article, to my mind, seems to prove that castration for tubercular testis is not generally desirable, although this is obviously an impression which it is not the object of the writer to convey.

CASTRATION.

J. R. Goodwin,¹¹⁸ of Fincastle, Va., reports a case in which castration was performed at the earnest solicitation of the patient

for the cure of masturbation. Erections continued, and intercourse and masturbation were practiced after just as before the operation. Robert Battey, of Georgia, in the same journal, reports an analogous case. I only know of two other cases bearing directly upon this subject,—one by Dr. Van Buren, in which imbecility coming on in a boy was attended by almost perpetual efforts at masturbation. An excision of a portion of the vas deferens on both sides failed to cure this boy, whose imbecility became complete, although his erections are stated to have ceased.

The elder Crosby, of Vermont, is said to have cured masturbation and arrested impending imbecility in a similar case in a boy by castration.

PERSISTENT PRIAPISM.

J. McKenzie Booth¹¹⁹ records a case of this unusually distressing malady in the person of a healthy seaman of 55 who had had no previous venereal disease, no injury to the nervous system, and alleged that he had committed no sexual excesses. The turbulence was continuous, painful, and not accompanied by sexual desire. All the varied means—opium, blisters, leeching, tartar emetic, ice, rest, bromides, purgatives, etc.—failed for five weeks. At the beginning of the sixth week five grains of iodide of potassium were ordered four times a day. Improvement began at once, and at the end of the seventh week the patient became and afterward remained well. Booth administered the iodide on account of having read a closely analogous case reported by Mitchell Bruce,¹²⁰—a man of 55; priapism for five weeks; cure in twelve days under iodide of potassium. Whether this patient had a venereal history or not does not appear.

The striking peculiarity in these cases seems to be that in both of them the iodide was used at the beginning of the sixth week and both recovered during the second week following. It naturally suggests the inquiry whether there may not be a neurotic variety of priapism which gets well in the seventh week. Such a supposition, of course, will not stand the test of one or two more cases.

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DISEASES AND INJURIES OF ARTERIES AND VEINS.

By JOHN H. PACKARD, A.M., M.D.,

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DURING the year 1887, very interesting additions have been made to the records of clinical experience in diseases of the circulatory system. Perhaps the most important of these additions consists in the fresh evidence afforded of the value of antiseptic precautions in operative procedures affecting the vessels. Especially is this shown in reference to our dealings with abdominal and gluteal aneurisms, but it appears also throughout the whole of this field of surgery.

In the matter of treatment, several points call for notice. Thus it would appear that the accumulated experience of surgeons has not yet settled the mere technique of the ligation of arteries. In a discussion at the Clinical Society of London,¹ Mr. Thomas Smith expressed an objection to the ordinary single ligature and reef knot, preferring to carry the ligature twice around the vessel and make a clove-hitch, then tying the two single ends together. It is neither necessary nor desirable, as shown by Dr. Edmunds and Mr. Ballance, to injure the arterial coats. Messrs. Butlin, Croft, Sydney Jones and H. Morris thought it best to apply two ligatures, and to divide the vessel between them. Mr. Ballance preferred to use only one ligature. Carbolized kangaroo-tendon was recommended as the material by Messrs. Smith, Butlin, Croft and Ballance. Mr. Morris thought it would not bear as much pressure (tension?) as silk would, but enough to close the vessel.

Small, round, aseptic ligatures are the best; they should be applied with all antiseptic precautions, and without injury to either of the arterial coats.²

Gay,³ of Boston, is in favor of applying two ligatures when ligating large arteries in continuity, and dividing the vessel between them.

Laplace,⁴ of Paris, proposes to exert direct compression on ex-

térnal aneurisms by a new method, viz., hollowing out a space in a ball of cork or other light wood; this is to be bound over the tumor with a figure-of-8 bandage, the limb being in semi-flexion. Extension augments the pressure, while flexion lessens it. Every five or six days the apparatus is removed, and the compression kept up as the tumor subsides, by filling up the hollow with pads or wadding. This plan is said to have succeeded in three cases of popliteal aneurism.

Our Corresponding Editor, Dr. Pulido, of Madrid, reports the case of a man of 44, under the care of Dr. Obelar,⁵ of Molinaseca, for thoracic aneurism, in whom marked benefit was derived from galvano-puncture.

Brancaccio,⁶ of Naples, cured a case by electrolysis, the patient living for three years, and then dying of pneumonia.

ARTERIAL SYSTEM.

Head and Neck.—Falcone,⁷ of Naples had two cases of traumatic aneurism of the occipital artery occurring in his practice, both in young men. In one, digital compression and compression by bandages and ice failed, and the tumor was operated upon. The procedure adopted is not stated. In the other, digital compression was first tried, and then the injection of a solution of ergotine around the periphery of the tumor, which was obliterated by this means. The diagnosis between aneurisms of the occipital artery and those of the vertebral, the compression of the carotid trunk failing to arrest pulsation in the latter, is dwelt upon.

Dr. T. M. Markoe⁸ exhibited to the New York Surgical Society a case of cirroid aneurism from traumatic cause, in which both external carotid arteries had been tied below the linguals; pulsation had ceased in the tumor, although the dilatation or central cavity remained. Dr. Bryant⁹ has reported to the same society a somewhat similar case, in which ligation of the external carotid and lingual arteries of the corresponding side proved of temporary benefit, but excision had finally to be resorted to.

Plessing,¹⁰ of Leipzig, records a case of cirroid aneurism of 17 years' standing, in a man of 21 years. Ligation of the main afferent arteries had been twice performed in vain; electro-puncture had also been futile, and extirpation was thought to be dangerous. Thiersch then had, every second day, 1 cubic centimeter of alcohol

injected at from four to six points around the tumor. Pulsation was less in two weeks, and after the injection of 143 cubic centimeters in all, it was converted into a solid mass.

Stuart,¹¹ of Boston, reports a case of embolism of the left vertebral artery, the clot extending into the basilar. There was general atheroma of the cerebral vessels. The symptoms, dizziness, dyspnœa, sweating and paresis, had lasted about two months,—an unusually long time.

Dittrich,¹² of Prague, has reported the case of a woman æt. 56, who died after symptoms of apoplexy of a few hours' duration. The preparation showed an aneurism as large as a cherry stone on the left internal carotid artery just beyond its entrance into the cranium. From a small rupture in its upper wall an extensive hemorrhage had taken place, communicating above and behind with the left lateral ventricle.

Fenger,¹³ of Chicago, records an instance of traumatic aneurism of the left vertebral artery by pistol shot. The common carotid was tied on the ninth day. On the thirty-third day pulsation had recurred and was increasing. The external carotid was tied and the sac opened; the vertebral artery was finally tied between the occipital and axis. Artificial respiration, injections of whisky, and transfusion of blood, had to be employed, but the patient made a perfect recovery.

Selenkow¹⁴ had a patient, a girl of 9, who during an attack of scarlatina, had a cervical abscess, and profuse arterial bleeding. The carotid was tied and life preserved, but with paresis of the extensors of the left hand and left leg, and deficient nutrition of the cerebral cortex.

Wyeth,¹⁵ of New York, advocates the tying of the external carotid and superior thyroid arteries for the arrest or prevention of hemorrhage from the terminal branches of the former, or in order to cut off the nutritive supply of certain morbid growths. He gives five successful cases in which this plan was adopted, two of epithelioma, two (in the same patient) of parotid growths, and one of aneurism.

Thoracic Aorta.—Among the cases reported, the following present features of special interest:—

Dr. Abbe,¹⁶ of New York, reports two cases, one of his own and one of Dr. Roosevelt's, in which fine steel wire was introduced

into thoracic aneurisms, a galvanic current being then passed through the coil. Dr. Roosevelt's case was that of a man *æt.* 25, syphilitic; 75 yards of wire were inserted, and a current of 25 milliamperes passed for half an hour. Some improvement ensued, but the patient died on the twenty-third day. In Dr. Abbe's, a man of 46, without specific history, there was a dissecting aneurism of the right subclavian. Besides the usual symptoms, there was profuse sweating on the left side of the face and in the left arm. 100 feet of No. 1 catgut was introduced, without benefit; on the ninth day 150 feet of fine steel wire was inserted, and a current of 50 milliamperes passed for an hour. The man died of rupture of the aneurism into the trachea on the second day. Lépine,¹⁷ of Lyons, and Charneil,¹⁸ of the same place, discuss the treatment of aneurism of the thoracic aorta by Moore's method, giving full details of the history of such procedures. Two cases which occurred in M. Lépine's service are recorded; in the second of these, the foreign body introduced was a watch spring sharpened to a lancet-point. The first patient, in whose case Florence silk had been used, died in five days of broncho-pneumonia; the second died on the thirty-seventh day, after repeated hemorrhages.

MacDonnell,¹⁹ of Montreal, has described a case in which an intra-thoracic aneurism, pressing upon the fifth and sixth intercostal nerves, caused for two months copious sweating over an area corresponding to the distribution of cutaneous branches of those nerves. The tumor subsiding under treatment, the sweating ceased. Oliver,²⁰ of Newcastle, records a case in which an aneurism arising from the posterior part of the aortic arch caused death by pressure on the trachea. There were no physical signs during life. Dr. Ferguson²¹ exhibited to the New York Pathological Society, an aneurism of the thoracic aorta, remarkable for its size. Urgent symptoms had existed only for 13 days. The patient had had syphilis; the aorta was atheromatous throughout. The sac measured transversely 22 cm., vertically 19 cm.

Wyeth,²² of New York, advocates distal ligation in aortic aneurism, citing a case in which he tied the right subclavian and carotid arteries. The patient lived twelve months, and was then carried off by acute diarrhœa.

Innominate Artery.—Dr. H. R. Wharton,²³ of Philadelphia, reports a case of innominate aneurism, in a gardener *æt.* 42, who

had had a severe fall upon his right shoulder, and about six months afterward felt pain in the part; a year later, there was dyspnœa; dysphagia, cough, and a swelling appeared. He had never had syphilis. Simultaneous ligation of the carotid and subclavian was performed by Prof. Ashhurst, with perfect success. Dr. McBurney²⁴ showed to the New York Surgical Society, a man æt. 35, probably syphilitic, who had been the subject of simultaneous ligation of the carotid and subclavian for innominate aneurism. The symptoms were relieved and the tumor reduced to one-fourth of its former size. Rosenstien,²⁵ of San Francisco, reports the case of a woman on whom, in 1883, he performed ligation of the carotid and subclavian arteries for innominate aneurism. The patient has been able to earn her living ever since. Dr. G. H. Lyman,²⁶ of Boston, records the case of a man æt. 38, with an innominate aneurism, which had probably begun about 18 months before his admission to hospital. No history of syphilis or alcoholism. After 14 months of thorough treatment by rest, low diet and pressure, with iodide of potassium, the carotid was tied, and 60 days later the subclavian. Marked relief was obtained for about 7 months. Cough and dyspnœa then set in, and he died exhausted 3 months later. An autopsy showed the sac, of capacity to hold one or two pints, filled with laminated clot all but about two ounces. Præger,²⁷ of Victoria, British Columbia, reports a case of innominate aneurism, with a history of traumatism. Simultaneous ligation of carotid and subclavian was followed on the second day by hemiplegia, which was permanent; but the aneurism was relieved. The patient lived nearly a year, when he died of bronchitis. No autopsy.

Arteries of the Upper Extremity.—Henderson²⁸ mentions a ligation (double) of the innominate artery, the vertebral being also tied, by Prof. Durante, of Rome, for aneurism of the second part of the right subclavian. On the eleventh day, the date of report, everything promised well.

Dr. Clark,²⁹ of Pittsburgh, reports a case of subclavian aneurism, in which a ligature was applied with temporary relief; but the man died of septicæmia on the seventeenth day.

Mr. Sheild,³⁰ of London, records a case of punctured wound of the brachial artery, treated by pressure; on the twentieth day secondary hemorrhage occurred, and a false aneurism was laid

open, the wound in the artery found, and a ligature applied above and below, with success.

Dr. Keen,³¹ of Philadelphia, reports a case of spontaneous arterio-venous aneurism of the arm in a girl of 18, who had also an innominate aneurism. Esmarch's bandage, and later a tourniquet and compression, failed; the tumor was then laid open, and all the vessels that bled were tied. Dr. Keen³² also reports a case of aneurism of an interosseous artery in a child of 8 years. The lesion occurred spontaneously, and disappeared in like manner.

Thiriar³³, of Brussels, remarks on the special risk of secondary hemorrhage in wounds of the palmar arches as usually treated. He advises ligation of both ends if possible; if not, acupressure, with curved needles, and figure-of-8 suture; this failing, ligation of the brachial. When there has been time for the establishment of collateral circulation, this must be done above the origin of the profunda. The possibility of a high bifurcation must be borne in mind.

Abdominal Aorta, etc.—Morse,³⁴ of San Francisco, has reported a case of traumatic aneurism of the abdominal aorta, exposed by laparotomy, after which, through an exploring needle, a yard and a half of silver plated copper wire was passed into the cavity of the sac. On the tenth day there was occlusion of the left femoral, which was only temporary. On the fifty-first day the patient was discharged, well. Taylor³⁵ has reported the case of a boy æt. 8, run over by a brewer's cart; death ensued from rupture of the aorta, just at the bifurcation, the viscera being uninjured.

Whittier,³⁶ of Boston, relates the case of a young man of 21, who four years before had had two very severe attacks of rheumatic fever. Apparently as the result of these, there was very extensive disease of the entire circulatory system, the chief features being referable to dissecting aneurism of the mesenteric arteries, with a perinephric hæmatoma, as shown by the autopsy.

Mr. Sidney Phillips³⁷ discusses the subject of pulsating aorta, giving eight illustrative cases. This affection may be due to mechanical strain, arteritis, peritonitis, inflammation of the stomach or intestines; sometimes it is a manifestation of gout. As to its symptoms, pain is often the chief of these, and may be located in the epigastrium, umbilicus or back; melæna or hæmatemesis may occur; a tumor, evidently intestinal, is often present; dryness of

the mouth and contraction of the pupils have been noted. A resulting symptom is apt to be hypochondriasis. Spontaneous disappearance of the disorder usually occurs in time.

Gluteal and Sciatic Aneurism.—Dennis,³³ of New York, advocates the treatment of gluteal and sciatic aneurisms by laparotomy and ligation of the internal iliac artery within the pelvis. He thinks it best to turn the intestines and omentum out of the cavity, so as to gain clear access to the vessel. Of his two illustrative cases, in one, a woman of 60, both internal iliacs were tied, a gluteal aneurism existing on each side; death ensued from suppression of urine on the fourth day. In the other, an aneurismal varix, the patient, a girl of 18, recovered. Chew,³⁹ of Birmingham, Ala., recommends the same course, but thinks the intestines should be disturbed as little as possible. He records a successful case in a negro; æt. 46.

ARTERIES OF THE LOWER EXTREMITY.

Mr. Latimer,⁴⁰ of Swansea, reports the case of a man æt. 34, in whom an aneurism of the femoral artery seemed to have been caused by the pressure of an ill-fitting truss. The external iliac was ligated with perfect success. Richardson,⁴¹ of New Orleans, cured a femoral aneurism, high up, in a man of 55, syphilitic, by flexion and elevation of the limb continued for two weeks.

Mr. Bartleet,⁴² of Birmingham, reports a case in which a man, aged 32 years, had an aneurism of the right common femoral, for which the external iliac was tied in June, 1886. A year afterward he had an aneurism of the left superficial femoral, for which ligation was done with success. No cause, general or local, could be assigned for either lesion.

Anderson⁴⁷ records the case of a man of 42, the subject of inguinal aneurism in the right side, and of popliteal aneurism on the left. He had been intemperate, but there was no history of constitutional syphilis. Ligation of the right external iliac artery was performed July 31, 1885, stout carbolized catgut being used. The other aneurism was treated in September by combined digital compression and galvano-puncture, the current being passed for five minutes only, but the needles left in place for 20 hours. Both operations were successful. January 10, 1887, the man was admitted again with aneurism of the aortic arch, and died in three days.

Godwin,⁴⁸ of Netley, reports a case in which a man of 29 was wounded just above the knee by a pointed stake. Twenty-one days afterward, two aneurismal tumors appeared, and were treated by digital pressure for 14 hours daily "for a considerable time." The tumors grew smaller and gave no inconvenience. No further treatment was thought necessary. Mr. Bryant,⁴⁹ of London, records a case of popliteal aneurism in a man of 30, who had been subjected to weight-pressure, Esmarch's bandage, and electrolysis, in vain; but digital pressure on the femoral kept up for 22 hours, proved effectual. A. H. Butcher,⁵⁰ of Birkenhead, reports a case of popliteal aneurism in a man of 59, who had general atheroma, aortic obstruction, an intermittent pulse, and bronchial catarrh. After treatment by pressure, flexion, cold and iodide of potassium, he was discharged relieved, but returned in eight months. The superficial femoral was now tied with silk, but on the second day bleeding occurred and another silk ligature was applied an inch higher up. A week later, another bleeding came on, and ligation was performed a third time, the distal end being now tied also. Twenty days afterward, a large abscess was opened and drained; this did well, but dysenteric diarrhœa came on and the patient died on the ninth day. Mr. Butcher suggests the use of a form of acupressure in cases of aneurism with atheroma. Prof. Weinlechner,⁵¹ of Vienna, gives the history of a man in whom a popliteal aneurism, after the failure of various methods of treatment, was cured by ligation of the superficial femoral. Ten months afterward, he returned with gangrene of the big toe from frost-bite; and eleven months afterward, again, with perforating ulcer of the sole. Both these lesions were quickly cured. Their occurrence was ascribed to alterations in nerve structure from the pressure that had been applied. Brunner,⁵² of Zurich, reports four cases of subcutaneous injury to the popliteal artery. In two there was luxation of the knee, in the third forced over-extension. Diffuse traumatic aneurism resulted from total or partial rupture of the vessel, gangrene ensued, and amputation became imperative. In the fourth case there was only a slight tear in the arterial wall, followed by a circumscribed traumatic aneurism. The gangrene which ensued, and for which amputation was performed, was due to an embolus in one of the arteries of the leg.

Garrard,⁵³ of Rotherham, relates three cases of injury to the

popliteal vessels from violence to the knee; in each gangrene ensued and amputation became necessary. Mr. Vincent Jackson,⁵⁴ of Wolverhampton, records a case of complete rupture of the popliteal artery and vein by a mass of rock falling on the limb. Gangrene ensued and amputation was performed on the tenth day with success.

Meton d'Alencar,⁵⁵ of Rio de Janeiro, records a case of popliteal aneurism simulating suppurative arteritis. The swelling being punctured with a trocar, blood issued through the canula, and the artery was at once ligated at the apex of Scarpa's triangle. Lymphangitis of the whole limb ensued, threatening gangrene. Fluctuation being still felt, the opening previously made was enlarged, and enormous quantities of coagula and pus evacuated. Tetanus ensued, and the patient died.

W. Johnson Smith,⁵⁶ of Greenwich, relates the case of a man æt. 38, with venereal but not syphilitic history, who had aneurism of the left popliteal artery, for which the superficial femoral was tied July 27, 1886. Discharged cured on March 26, 1887, he was readmitted April 26, with an aneurism of the right popliteal artery; ligation of the corresponding superficial femoral was performed May 12, and he went out cured early in June. Roberts,⁵⁷ of Louisville, reports a case of popliteal aneurism of very sudden occurrence, seemingly from the lodgment of an embolus; the patient, a man of 22, had valvular disease of the heart. Ligation was performed in Hunter's canal, with success. Dr. Myers,⁵⁸ of Fort Wayne, Ind., reports a case of pistol shot wound of the popliteal artery, followed by traumatic aneurism and enormous swelling. The femoral was tied at the apex of Scarpa's triangle, and recovery ensued.

Mathelin⁵⁹ cites a case of traumatic aneurism of the anterior tibial artery, developed on the tenth day after a simple fracture of both bones of the leg, and cured by pressure applied to the femoral just at the groin. The consolidation of the bones took place slowly but steadily.

VENOUS SYSTEM.

Dr. Tipton,⁶⁰ of Selma, Ala., records the case of a young man wounded in the neck with a razor, the external jugular vein being severed and the internal cut about half way across. The doctor

saw him only a few moments after the occurrence, bleeding furiously, and applied pressure effectively with his thumbs until aid came, when he tied the internal jugular on the distal side. Some bleeding recurred when the foot of the bed was raised, but stopped on elevation of the head and neck.

Mr. A. P. Gould⁶¹ reports a case of knife-wound of the femoral vein at the groin. The wound was enlarged and the femoral, internal saphena and another vein, were tied with carbolized silk. Symptoms of septicæmia developed, and on the tenth day there was profuse bleeding from the femoral artery, which was tied, ligatures being also placed upon the superficial femoral and profunda. Death occurred the next day. Mr. Gould thinks the septicæmia was due to infection conveyed by the knife, and discusses the treatment of vein-wounds, giving a tabulated statement of those on record.

H. Schmid,⁶² of Berlin, advocates the lateral closure of wounds of the veins by means of forceps, left in place. In experiments on rabbits, he found the sealing of wounds closed with *serre-fines* complete in 24 hours, but would not look for firm cicatrization in less than two weeks. Clinical observations in seven cases confirmed the results of his experimental studies.

Dr. H. P. Robinson⁶³ showed to the Pathological Society of London a specimen of aneurismal varix removed from a stump, amputation of the leg high up having been done sixteen years previously. It was caused by a blow on the stump; the artery and vein had been tied high up, and the pulsating mass excised. Free communication existed between the vessels.

Kölliker,⁶⁴ of Leipzig, describes a vein forceps intended to facilitate the isolation and tying of the veins met with in tracheotomy and other operations about the neck, as well as elsewhere. It consists merely of a slide-forceps with one blade prolonged slightly, and grooved like a director.

Voituriez,⁶⁵ of Lille, records a case of varices of the upper venous system, in a man aged 35, who came under treatment for multiple contusions. All the veins above the elbows were varicose, as well as those of the pectoral regions and the head and neck. On the back the condition was much less marked. On forced breathing, the external jugular veins became enormously distended. In the dorsal decubitus, there was marked venous pulsation, clearly

pre-systolic. No sign of ectasis was presented by the veins of the lower system, in the limbs, scrotum or rectum. The heart and arteries seemed sound. The lesion was ascribed to contraction of the descending vena cava; it was congenital, and had given rise to buzzing in the ears, cerebral oppression and repeated epistaxis. Voituriez thinks this the only case known in which both sides were affected in this way, and regards the lesion as a defect of development. He reviews the symptoms as detailed in cases in which a sound and an affected side could be compared.

Dr. L. S. Pilcher,⁶⁶ of Brooklyn, writes in favor of the ligation of arteries in cases of sudden occlusion of the main veins of a limb; the idea being not to cut off the entire circulation, but to diminish the influx of blood and thus to prevent stasis. He thinks the axillary artery in the upper extremity, and the superficial femoral in the lower, might be safely secured with such an object.

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[Undated references apply to journals published in 1887, and original articles can be found by consulting the indexes of the respective publications.]

FRACTURES, DISLOCATIONS, AND SPRAINS.

By LEWIS A. STIMSON, M.D.,

NEW YORK.

IN the treatment of fractures no noteworthy changes have been introduced, but additional experience has been gained in two procedures of recent origin: massage in recent fractures, and the insertion of pieces of fresh bone between the fragments after failure of union.

Massage, for from fifteen to sixty minutes, repeated every day, or at intervals of two days, was recommended in 1886 by Lucas-Championnière, and a number of cases have been reported, mainly in French journals, in which its employment was followed by an unusually rapid recovery. Its value appears to be greatest in fractures in the neighborhood of joints, as in Colles's fracture at the wrist, and Pott's fracture at the ankle. It is recommended that at first the pressure should be made only above and below the seat of fracture, so as to avoid giving pain, but as the sensibility rapidly diminishes under the manipulation, it will soon be possible, sometimes during the first sitting, to manipulate the whole length of the limb. With the massage is combined passive motion of the neighboring joint. In one case, Colles's fracture, the patient was able to use the hand in writing on and after the third day, and considered himself entirely well by the end of the third week. The only dressing was a bandage upon the limb. In a second communication upon the subject, made to the Société de Chirurgie, June 1, 1887, M. Lucas-Championnière urges that the sittings should be prolonged, especially because the first ten or fifteen minutes must be given to diminishing the sensitiveness of the limb and accustoming it to the vigorous pressure, which alone is efficacious, and he repeats the warning against manipulating in such a way as to cause pain. When the fracture is of the shaft of a long bone, he uses a narrow splint

to secure immobility of the fragments, and at the same time leave sufficient space for the massage.

The testimony to the value of the treatment in hastening convalescence after Colles's fracture and fracture of the lower end of the fibula with little or no displacement, coming, as some of it does, from physicians who were themselves the patients, cannot be disregarded, but it seems unlikely that it will ever come into general use in the fractures of the long bones, in the treatment of which the permanent dressings now in use give an equal freedom from pain, and, admitting all that is claimed for massage, secure as complete a recovery after an interval that is but little longer.

The advantages of early and exact immobilization of the fragments has been again urged at considerable length by Raoult-Deslongchamps,¹ who brings much testimony to prove the value of zinc splints moulded to the limb. The splints are cut from sheet zinc, bent into gutters, padded with cotton, and bound to the limb with straps; they are applied as soon as the patient is seen, and tightened or relaxed from day to day according to changes in the swelling. The patients are not confined to the bed. The article contains numerous cuts, showing the shapes needed for the different limbs and fractures. The results claimed for this splint after fracture of the leg are fully equal in freedom from pain and confinement, and in rapidity of cure, to those claimed for massage.

A successful attempt to transplant bone in a case of ununited fracture of the tibia was reported to the Académie des Sciences, by Poncet.² The patient, aged nineteen, had sustained a compound fracture of the tibia about the middle of the shaft, thirteen months previously; this had been followed by necrosis. On January 19th, half of the first phalanx of the big toe, measuring about one inch in length and half an inch in width (the articular ends having been removed), from the recently amputated limb of a healthy man aged forty-three, was inserted between the fragments after having been soaked in sublimate solution for three minutes. Antiseptic precautions were taken and the graft did well, but at the end of two months the tibia was still movable, and M. Poncet decided to resect the fibula and tibia. It was then found that there had been very little loss of

substance on the part of the graft, which was united firmly to the lower fragment of the tibia by fibrous tissue, but was separated by about a quarter of an inch from the upper fragment by weak fibrous material.

In cases of fracture of the long bones, in which it is difficult to maintain the coaptation of the fragments, Professor Socin³ and Bircher⁴ have employed ivory pegs, introduced lengthwise into the medullary canal. In Socin's three cases the pegs healed in; in Bircher's five cases suppuration persisted, and the pegs were subsequently removed after consolidation of the fracture; the removal was easy, through a small opening made with a chisel in the cortex of the bone.

INTRA-UTERINE FRACTURES.

To the list of multiple intra-uterine fractures is added one described by Linck.⁵ An eight-months' fœtus presented multiple fractures of the clavicle, ribs, and limbs, some recent, others united by callus. Excluding rachitis and syphilis, he attributes the fractures primarily to an unknown affection of the bones, leading to abnormal softness and fragility. He finds the immediate cause of such fractures in exaggerated abdominal pressure, scantiness of the amniotic liquid, and the movements of the fœtus.

Braun⁶ describes a deformity observed in children soon after birth or in early infancy, which he thinks can be accounted for only by a fracture of the tibia in utero. He has seen five cases. The most striking symptom is an angular curvature, never in the upper part, and usually in the lower third of the leg. The skin over the convexity is altered, sometimes bears a cicatrix, and sometimes is bleeding. The fibula is frequently absent, in part or entirely, sixteen times in twenty-seven cases. Defects of the toes are also frequent.

FRACTURES OF THE SKULL.

A large number of these cases have been reported, most of which can be grouped in two classes; the first, and much the larger one, that of cases in which recovery has followed very severe and extensive injury; the second, that of cases in which injuries, apparently trivial, have resulted in death. As the pos-

sibility of such terminations has long been well known, most of these reported cases have but little general interest.

An analysis of twenty-seven cases treated in a single hospital in Spain has been made by Ercilza,⁷ some of the results of which are worth notice. In the first place, they have added nothing to the knowledge of cerebral localization, probably because the conditions necessary to exact observation were rarely present; secondly, the differentiation of symptoms due to depression of bone from those caused by contemporary or subsequent effusion was very difficult; but when depression could be excluded, symptoms of compression were almost certainly due to internal hemorrhage. Unfortunately, positive inferences as to the situation and source of the hemorrhage cannot always be drawn. Among the twenty-seven cases were five of cerebral abscess, a late complication which the author believes to be more frequent than is generally supposed: "It usually forms slowly, with very slight or almost inappreciable symptoms which are apt to be misinterpreted. It more especially follows depressed fractures of the skull which do not permit the entrance of air, such as those in which the integument is uninjured, or when splinters have been projected from the inner table without any crushing of the outer, and, occasionally, when there has been concussion of a circumscribed portion of brain without any osseous lesion whatever." Of the five cases, four died without surgical interference; in one the abscess was opened and drained, and the patient recovered. One of these survived four months with an enormous abscess in the brain, showing no other symptoms than slight paralysis with aphasia.

Two other reported cases have a bearing upon the theory of cerebral localizations. In one, a carefully studied and well-reported case by Baldwin, the patient received an extensive compound comminuted fracture of the upper posterior portion of the right parietal and the adjoining part of the occipital bone, with laceration of the underlying portion of the brain that extended to the posterior part of the right lateral ventricle; the gap in the brain a month after the injury was two inches long and deep, and more or less wide up to half an inch, according to the varying intra-cranial pressure. This wound in the brain extended from a point a little above and nearly three inches behind the ear upward, and a little forward, and probably involved "the first

and second parietal, angular, and second occipital convolutions." Motion, sensation, intelligence, and all the special senses except vision were unimpaired; "there was complete hemianopsia, involving the right half of each retina," and the author attributes this symptom "to lesion of the cuneus only, or of it and the gray matter immediately surrounding it on the mesial surface of the occipital lobe, in the hemisphere opposite to the dark half fields."

The other case was one reported by Berger and Klumpke,⁹ in which there was well-marked aphasia without appreciable lesion of Broca's convolution, of those of the insula, or of the connecting fibres. There was a transverse fissured fracture of the right middle cerebral fossa ending at the foramen rotundum, a second crossing the petrous portion of the right temporal bone, and a third in the anterior fossa at the junction of the orbital plate of the frontal and the lesser wing of the sphenoid; the anterior branch of the right middle meningeal artery had been torn, and an extravasation of blood between the dura and the bone filled the right middle cerebral fossa. Notwithstanding the presence of this large extravasation, there were no symptoms of compression, and apparently no diminution of intelligence.

FRACTURE OF THE FIRST RIB.

Fracture of the first rib has heretofore been thought to be extremely rare, but if the observations and experiments recently made by W. Arbuthnot Lane¹⁰ should be confirmed, it will be found among the most common. In the first paper, he showed experimentally that pressure transmitted to the thorax through the clavicle produced fracture of the first rib with greater facility and more frequency than it did fracture of the clavicle, which is well known to be a common accident; and in the second paper he reports that the examination of less than 200 subjects received in the dissecting-room, has shown four undoubted examples of fracture of the first rib, from which he concludes that this injury "occurs in at least two per cent. of that class from which our dissecting-room supply is drawn." In addition to these cases there were several in which he thought the rib had been broken, but concerning which there might be some difference of opinion, and several cases of fracture of the first costal cartilage. In the fourth specimen, the neck of the rib had been broken close to the facet

for articulation with the transverse process, and the vertebral fragment had been displaced downward and forward.

F. Marsh¹¹ reported a case of supposed fracture of the first rib in its anterior half, uncomplicated by any other injury; the patient had fallen forward upon the shoulder. The diagnosis was made upon the fact that when the sternal end of the rib was steadied with the fingers, and pressure was made upon it in the supra-clavicular fossa close to the scalenus anticus, distinct crepitus was elicited. Motion of the arm and scapula also caused crepitus. Pain was caused by deep inspiration, coughing, etc.

A. F. Messiter¹² reported a case in which the first rib, together with the second, third, and fourth, had been broken, and the sternal end of the clavicle dislocated forward. The first rib was broken at the subclavian groove, the second at its middle, the third and fourth behind the angle.

CLAVICLE.

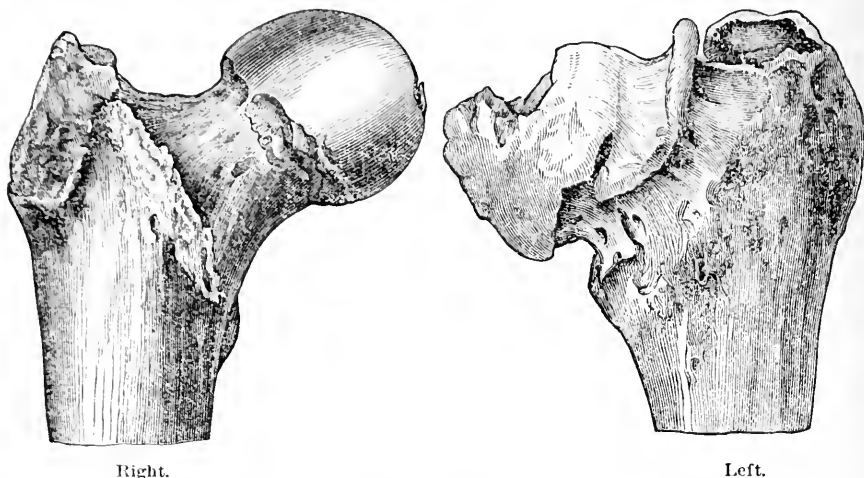
Several cases of simultaneous fracture of both clavicles have been reported: among them Bennett and Flinn¹³ and Ringwood.¹⁴ One of Bennett's patients was a girl only six years old. The record does not state the result in this case, but in the others union took place, a fact which is made noteworthy by the comparatively frequent failure of union in similar cases heretofore reported.

FRACTURE OF NECK OF FEMUR.

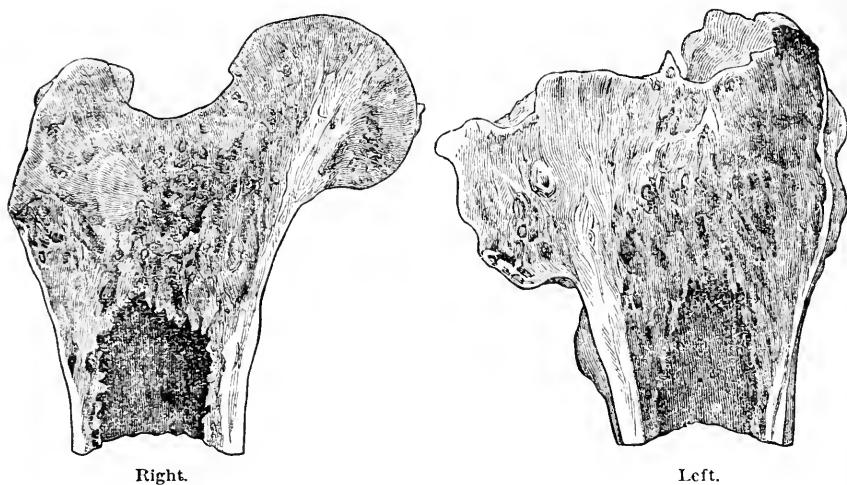
The recorded cases of bony union after intra-capsular fracture of the neck of the femur are so rare, that one reported by Thomas F. Raven¹⁵ deserves mention. It is briefly described as follows:—

“A woman, aged 69, slipped and fell, and on examination presented the usual symptoms of fracture of the neck of the femur, without impaction. She was treated with a long splint, and no extension was made. Her recovery was so rapid and she walked so well subsequently, although with a shortened limb, that I was inclined to doubt the accuracy of my diagnosis, and to suspect that the fracture had occurred high up in the shaft. A short time ago she died, at the age of seventy-six, and I was enabled to secure the upper portion of each femur. The accompanying sketches, made with artistic fidelity by Mr. Arthur Trower,

M.R.C.S., show how close to the head of the bone the fracture really was, and give a good idea of its complete bony union, and also of the contrast between the injured and uninjured bones,



Bones removed from a woman, aged 76 years, who sustained a fracture of the neck of the left femur seven years previous to her death. The sketch shows strong bony union and erosions of the head of the bone from arthritis.



both in regard to the fracture itself and the resulting osteoarthritis.

“Sir James Paget tells me, after an inspection of the bones, that he does not remember to have seen so thorough a repair of

this kind of fracture, and by his advice I have presented the specimens to the Royal College of Surgeons, where they will be found in the Pathological Museum."

FRACTURE OF THE PATELLA.

Resort to arthrotomy and metallic suture of the fragments in recent fractures of the patella has continued, but apparently with diminishing frequency, and in several quarters the authoritative protests against it of experienced and esteemed surgeons have been uttered. Von Bergmann¹⁶ after quoting the statistics collected by Divernesse, Brunner, and Ruhland, says: "Whatever faults may be charged against the unsuccessful surgeons and their antiseptic measures, the fact of frequent failure cannot be disregarded, and all the more because the majority, the very great majority, of transverse fractures recover with relatively good restoration of function, without suture and without operation, even when the reunion of the fragments is not close and bony."

Kirmisson,¹⁷ of the Surgical Society of Paris, absolutely rejecting it for all cases in which the separation is not more than an inch, questions the propriety of applying it even to old cases and those in which the separation is greater. He quotes the statistics published by Valaguier in the *Archives de Médecine*: 43 recent cases yielding 27 successes, 7 with loss of mobility, 7 followed by suppuration, in 2 which amputation of the thigh was done, and 2 deaths, 1 by pyæmia and 1 by carbolic acid poisoning; of 45 operations in old cases, 22 were successful, in 9 there was partial ankylosis, in 11 complete ankylosis (10 after suppuration of the joint), and 3 died. He meets the assertion that the failures were due to defective antisepsis by pointing out that some of them occurred in the practice of surgeons who are known to be among the most skillful and careful; and he adds, very judiciously, that as fracture of the patella is a common accident, it must be expected that if the principle should be established that the proper method of treatment is by suture, the practice would not be restricted to the fervent believers in the antiseptic method. The proportion of failures would, therefore, probably be larger.

In a discussion of the subject in the New York Surgical Society, following the reading of a paper by Dr. Rushmore, in

which the practice was not commended, Dr. Sands spoke against it, and Dr. Lange said he employed it only when special indications existed therefor.

A number of successful cases of suturing have been reported during the year, and some failures. Among the latter was one death from pyæmia (Byrd), 2 of caries of the patella (Fowler,¹⁸ and Von Bergmann),¹⁹ and 2 of ankylosis, one of them after sup-puration of the joint (Lange).²⁰ In some of the cases reported as successes the joint was only slightly movable at the time of the report, but a free range of motion was expected to follow the use of the limb. That such expectation is justifiable is abundantly proved by experience, but yet it must be remembered in a few cases it has failed of realization; in a case mentioned by Dr. McBurney in the discussion in the New York Surgical Society, in which bony union was thought to have taken place, the bone was refractured three months later by very slight force exerted in making passive motion.

The necessity of caution in assuming the existence of bony union, even when no independent mobility of the fragments can be detected, has been again shown by Bogdanik,²¹ who had the opportunity of examining a supposed example eighteen months after the operation; on dividing the patella longitudinally, he found the fragments to be united by a fibrous band "of cartilaginous consistence, barely two or three millimetres wide."

In old fractures with much separation, in which the fragments cannot be easily brought together, Von Bergmann²² recommends a procedure which he successfully practiced in one case; after opening the joint and fracturing the surfaces of the fragments, he made a second incision a handbreadth below the first, and with a chisel separated the tuberosity of the tibia from the bone, the line of separation extending upward into the joint. He was then able to bring the fragments of the patella together, and the patient made a good recovery, with a useful and movable joint.

Treatment without fixed dressings, but, on the contrary, with early (second week) active and passive motion of the joint, and massage of the quadriceps extensor, recommended a year or two ago by Tillanus, of Holland, does not appear to have gained adherents except in respect to the massage, which is warmly com-

mended by some as an efficient means of shortening the period of convalescence, by restoring power to the muscle and freeing the joint of adhesions. The removal from the joint of the blood by aspiration or puncture with a large trocar is sometimes practiced.

The use of Malgaigne's hooks seems to have gained somewhat in favor; and an ingenious modification of them by Dr. William Otis, of New York, by which their application and adjustment are made much easier, should make it more general.

The interposition between the fragments of shreds of the anterior fibro-periosteal lining of the patella, which has been noticed in some cases, and to which, by a hasty generalization, the failure to obtain bony union has been attributed, has been proved by later observations to be absent in a considerable proportion of cases, and, indeed, considering the facility with which such tissue undergoes ossification, it may be doubted whether such interposition would be an insurmountable obstacle to bony union.

An interesting example of late partial ossification of a long connecting fibrous bond has been reported by Dr. Anderson.²³ The separation was about one and a half inches; the bond of union was strong, and in its centre was a bridge of bone uniting the two fragments. An interval of twelve years had elapsed between the injury and the patient's death, during most of which time the joint was freely movable and as useful as the other.

AVULSION OF THE TUBEROSITY OF THE TIBIA.

Two cases of this rare injury have been reported: One by Dr. J. C. O. Will,²⁴ the other by Keyser,²⁵ reported by F. Ecklund, Corresponding Editor. In the first, the patient, a lad 17 years old, while jumping with a pole, felt something give way in the region of the knee. The next day the joint was greatly swollen and painful to touch, "and there were two small movable bony swellings, one at the upper, and the other—the smaller one—at the lower aspect of the articulation." There was loss of active extension. The injury was thought to be a transverse fracture of the patella, and Dr. Will proceeded to wire the fragments together. "The patella was exposed . . . by a vertical incision, when I found that it was intact, but that there was a fracture of the tubercle of the tibia; the ligamentum patellæ . . . having been

torn away with the bony prominence into which it was inserted. The portion of bone was about the size and shape of a small oyster-shell, and on the incision being extended downwards so as to expose it more thoroughly, its fractured surface was turned upwards from muscular contraction. It could, however, be readily replaced, closing with a snap not unlike that of a Cavendish whist-marker. The joint was full of blood." He fastened it down by perforating it with a drill, leaving the latter in place. The joint was then cleared of blood, and the wound closed. Antiseptic dressing. Nineteen days later the drill was removed, healing being complete except at the point occupied by the drill. An immovable dressing was worn for the following six weeks; ten days later the patient was allowed to walk with crutches, and a month later the functions of the joint were completely restored.

In a similar case it is probable that the error in diagnosis would not be made, if the possibility of the injury were borne in mind and the region of the tuberosity examined.

Keyser's case was very similar: the patient, a young man, was jumping in the gymnasium, and, while in the air, felt a sharp pain in the knee, and was afterwards unable to stand. The tuberosity of the tibia could be felt as a movable, hard body under the skin, which was raised by it. Strips of adhesive plaster were placed longitudinally on the thigh above the patella, and drawn downward by attached bands, and other strips of plaster were applied circularly around the upper part of the leg and the fragment. The patient made a good recovery.

VERTEBRÆ.

An interesting case of diastasis between the fifth and sixth cervical vertebræ is reported by Quénu;²⁶ it appears to have been caused by violent flexion of the neck. There was complete loss of sensation in the lower limbs, the lower three-fourths of the trunk, and in the hands, except at the thenar eminence. The patient died suddenly a few hours after the accident. The autopsy showed fracture, without displacement, of the right transverse process of the sixth and of the tip of the right articular process (the lower) of the fifth vertebra; rupture of the ligaments flava between the fifth and sixth, and partial rupture of the corresponding intervertebral disk. Except for a small clot of

blood between the bone and the dura at the same level, no lesion was apparent within the canal, and the cord seemed to be uninjured, but on making cross sections of the latter a hemorrhagic focus was found in its centre, having its maximum at the level of the junction between the fifth and sixth vertebræ, and extending upward and downward nearly an inch; it appears to have occupied only the central canal and the gray matter of the cord. The mode of production, absence of horizontal displacement, and rupture of the yellow ligaments, indicate that the lesion was produced by forcible elongation of the cord in extreme anterior flexion of the column.

SHOULDER.

Caird²⁷ describes and pictures some new specimens, and reviews the literature of the subject in support of the view which has of late been gaining ground, that the changes in the head of the specimens found in old anterior dislocations are in part the result of direct bruising, or indentation effected by its violent contact with the inner edge of the glenoid cavity at the moment of dislocation, and that fracture of the anatomical neck, which sometimes complicates subcoracoid dislocation, is an extreme form of the same injury. The view seems now to be satisfactorily established.

Macleod's suggestion,²⁸ that, in reducing an anterior dislocation of the shoulder, the patient should be placed supine upon the floor, in order to obtain full muscular relaxation, and that then traction should be made at right angles from the side of the chest (abduction), has been favorably received and warmly commended by a number of surgeons who have reported successes.

ELBOW.

A case of compound dislocation marked by a unique complication, is reported by Perret.²⁹ A boy 14 years old had his arm caught in a threshing machine and received a compound dislocation backward of the elbow, the lower end of the humerus projecting two inches through a wound on the anterior and inner aspect of the joint. The brachial artery was ruptured, and the median nerve denuded for a distance of four or five inches and forcibly stretched. The dislocation was reduced, and the wound dressed antiseptically. On the seventh day all the

denuded portion of the nerve had become gangrenous. Recovery was complete at the end of a month, with full freedom of motion in the joint. Sensation and muscular contractility were normal in the region supplied by the median nerve, a condition which was attributed to an anastomosis with the ulnar nerve below the point of rupture. Electrical stimulation of the ulnar nerve in the arm caused contraction of the muscles normally supplied by the median.

WRIST.

A dislocation of the wrist backward and upward, in a boy 16 years old, is reported by Walker;³⁰ it was produced apparently by pressure against the palm of the extended hand while the back of the elbow was fixed. Reduction was easily made, with a distinct click as the bones went into place.

Another, in a child less than a month old, cause unknown, is reported by Harrison.³¹

A dislocation *forward*, in a boy 16 years old, is reported by Aitken;³² it occurred in a fall from a tree, was almost compound anteriorly, and was easily reduced with a loud snap.

BONES OF CARPUS.

Albertin³³ reports another example of the rare dislocation of the *semilunar* bone. The patient, a man, had fallen from a height of twenty-five feet, striking upon the palm of the left hand. The bone was found protruding through the skin of the palm, almost all its attachments to the other bones having been torn. It was removed, and the wound dressed antiseptically, but the patient died of tetanus in a week.

HIP.

As the subject of spontaneous or pathological dislocations of the hip has recently received considerable attention, it will be well to note three cases reported during the present year. One by Lannelongue,³⁴ the result of a suppurative arthritis following diphtheria and erysipelas; a second by Pickering Pick,³⁵ double, the result of pyæmic synovitis, of which one was forward, the other dorsal, and both treated a year later by osteotomy; and the third by Deviliers,³⁶ a compound dorsal dislocation, the result of a deep slough of the buttock following typhoid fever.

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AMPUTATIONS, EXCISIONS AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS.

By P. S. CONNER, M.D., LL.D.,

CINCINNATI.

AMPUTATIONS.

DENNIS,¹ in a clinical lecture delivered at Bellevue Hospital, considered at some length the general principles involved in amputations, treating of the times at which, the reasons for which, and the mode in which the operations should be performed. He urged that by attention to every requisite detail an effort should be made to secure immediate union, unless the circumstances of the case are so unfavorable as to compel union by granulation and cicatrization, when the "open method" should be adopted,—a method regarded as thoroughly antiseptic in the highest and broadest sense.

In diabetics, Koenig,² while recognizing the increased likelihood of the reception and development of microbes, and the diminished resisting power of the tissues, advises, when gangrene exists, that amputation (under the strictest antiseptic precautions) should be made when the general and local symptoms are steadily growing more grave and the life of the patient is in danger. The chances of recovery, though not so great as under other circumstances, are yet not so slight as generally thought; and in his paper Koenig reports two recoveries, the sugar rapidly disappearing after removal of the gangrenous limbs.

As a hæmostatic and antiseptic measure, Varick³ urges the use of hot water. Of 53 amputations since 1879, hot water being employed, but 3 resulted fatally (5.7 per cent.). In discussion, McGill stated that he had employed the method in 12 amputations, all the patients recovering.

To control hæmorrhage, Muscroft⁴ makes use of a steel pin passed under the main artery supplying the part,—a method that had previously been recommended by Spence, Trendelenburg and Varick.

At the June meeting of the Medical Society of the District of Columbia, J. Ford Thompson⁵ reported a case of death from shock during the performance of amputation for a four weeks' old fracture of the leg, the patient being in bad general condition and having the tissues of the leg and thigh infiltrated with pus. At the same meeting J. B. Hamilton reported a similar case. At the meeting of the Kentucky Medical Society, Rodman⁶ advocated the performance of amputation during shock in cases of extensive contusion of a limb, *e.g.*, railroad injury, provided always that the temperature was above 96° F., contending that in such cases delay is generally followed by increased feebleness and diminished chances of recovery.

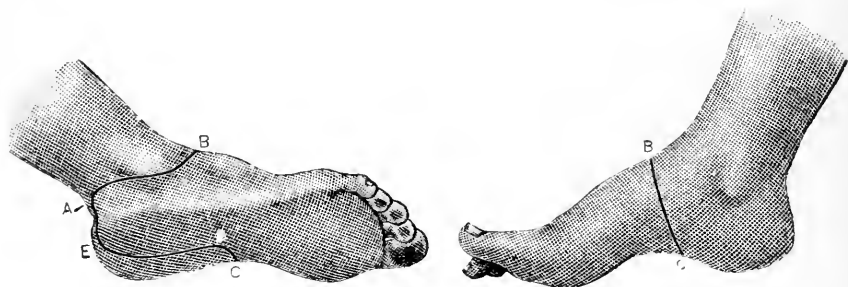
Trélat⁷ reports that at La Charité, from Nov., 1884, to June, 1887, he had 25 major amputations (thigh 10, leg 10, arm 3, femur 2) with but one death (4 per cent.), and that in a case of complicated thigh injury. Closure of the amputation wounds took place rapidly, and the resulting stumps were of good character. This success, much superior to what he had previously had at Necker (in 4 years, 27 amputations: thigh 12, leg 10, arm 3, forearm 2, with 7 deaths,—26 per cent.), he attributes entirely to the rigorous employment of antiseptic measures. Page⁸ reports 222 major amputations at the Newcastle-on-Tyne Infirmary in the last four years, with 12 deaths (5.4 per cent.: 2.4 per cent. from injury, 7.1 per cent. from disease), thoroughly antiseptic operations being done.

SPECIAL AMPUTATIONS.

Berger,⁹ in a monograph upon amputation of the upper extremity in the contiguity of the trunk (interscapulo-thoracic amputations), enters extensively into the consideration of the literature, the indications, the method of operating and the statistics of removal of the scapula and upper extremity, and advises that in cases requiring such operation the middle part of the clavicle should first be exsected and the subclavian artery and vein tied, the extremity being removed preferably by pectoro-axillary and cervico-scapular flaps. Bennett May, Andradas (Madrid), Obalinski (Cracow), and Swain (Plymouth, Eng.), have during the year reported successful cases of this operation, though in Swain's case the removal of the scapula was secondary to that of the upper extremity.

Paci, of Pisa, advises that when total extirpation of the scapula is made the upper extremity should at the same time be removed, since the mortality is less, or at least would appear to be such from examination of the statistics he has collected, 38 cases with removal giving five deaths, 50 without removal 11 deaths, *i.e.*, 13.16 per cent. as against 22 per cent.

Of amputations at the hip 3 successful operations have been reported in this country, by Dennis, Muscroft and Walker, all for sarcoma, and 1 unsuccessful by Packard, secondary to excision of the head of the femur for traumatic necrosis, death occurring in four hours from shock and the effects of ether. Bradford,¹⁰ of Boston, reporting upon subperiosteal amputation of the hip joint after hip joint disease, states that of 82 cases of such character collected by Ashhurst and himself, the mortality was 27 per cent., and of the 22 cases since 1880 that he had collected, 14 per cent.



TAUBER'S OPERATION.—(*Archiv f. Klin. Chir.*)

In amputation of the leg Helferich¹¹ makes but a single flap taken from the inner surface, the periosteum being so lifted that the flap has upon its inside a broad strip of periosteum and fascia; the leg after the operation is kept upon its outer surface with the knee bent at an obtuse angle, thus preventing the tendency of the ends of the tibia to protrude. To prevent sloughing of the flap Mosetig-Moorhof¹² makes two unequally broad side flaps, the edges so adjusted that the anterior runs parallel with the inner edge of the tibia and the posterior lies over the middle of the calf, while the upper part of the inner flap is folded over the edge of the tibia. Curran,¹³ of India, reports a case of spontaneous amputation of both legs following frostbite, the stumps being conical, but healthy.

Ankle.—Tauber,¹⁴ of Warsaw, has advised as a modification of the Pirogoff operation, to begin the incision at the attachment

of the tendo-Achilles (A), carry it forward below the malleolus to the Chopart line (B), across the dorsum to the middle line of the sole (D) and then back to the starting-point, separating the bones and cutting off the foot, thus saving the posterior tibial artery, the tendo-Achilles and the post-calcanean bursa. Dixon, of Pittsburgh, thinks it of service to retain the post-calcanean bursa, and to saw the leg bones in a such manner as to form a concavity in which the bursa may rest.

Foot.—Murdoch,¹⁵ of Pittsburgh, strongly maintains the value of the Chopart amputation, though fully recognizing the superior merits of foot excisions when practicable, and believing that they should in great measure take the place of amputations. As a precautionary measure he recommends division of the tendo-Achilles at the time of performance of the Chopart operation.

EXCISIONS.

General.—In cases of tubercular disease in young subjects, excisions are generally regarded with but little favor because of the strong probability of recurrence, either in the neighborhood or at a distance, the frequency with which, especially at the knee, increasing and disabling shortening of the limb occurs, the less gravity of and equally beneficial effect of scraping and burning, and the favorable results which so often follow non-operative treatment. In patients over 35 or 40 years of age excisions are advised by but few. The presence of a grave constitutional state is almost universally regarded as a positive contra-indication. In gunshot wounds of the joints, Schuckardt¹⁶ holds that total excision is demanded only when both articular surfaces have been injured over a considerable extent; in most cases only arthrotomy being required, with removal of foreign bodies. Unless the wound is very extensive or dirty, free primary incision is not required, but simple antiseptic occlusion. Secondary excision is to be made when the desired result has not been secured and the healing process is interrupted. If possible to avoid it, an excision should not be made upon the field, because of the injurious effects of after-transportation.

SPECIAL EXCISIONS.

Scapula.—Ceci, reporting a successful total removal for osteoperiostitis following typhoid fever, with later regeneration of bone

and recovery of full use of the shoulder, states that as the result of his investigations he would place the mortality of complete excision at about 20 per cent.; that when made for neoplasms the prognosis is very uncertain, when from injury partial removal is usually sufficient, and when from inflammatory affections the earlier the removal the better.

Andry, in an extensive article upon scapular osteitis, declares that in the non-traumatic cases the disease usually begins in or close to an epiphysis, is often tubercular, will not spontaneously recover, and should always be treated by excision, partial or total, according to circumstances.

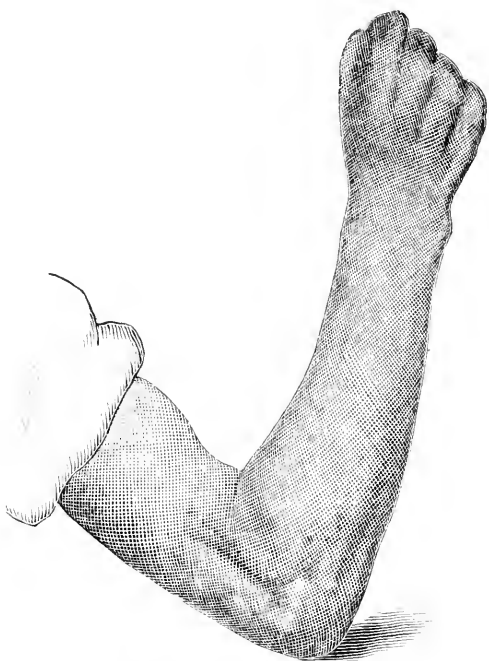
Shoulder.—Boeckel,¹⁷ in a somewhat lengthy paper, has considered the indications for the performance of this excision and the operative procedure, and has given somewhat in detail the histories of the 19 cases that he has operated upon. Of these, the excision was in 13 for disease, in 1 for compound fracture, and in 5 for gunshot injury, the mortality being in the first class 23 per cent., in the second 100 per cent. and in the third 60 per cent. The functional results in the cases that recovered were very good, and even when so much as one-half and more of the humerus was removed, the patient was left in better condition than if there had been a disarticulation at the shoulder. For compound fracture of the head of the humerus, whether produced by gunshot or otherwise, primary excision is advised, and in cases of old irreducible luxation, removal of the head of the humerus is recommended. The anterior linear incision is preferred as a rule, and a subperiosteal operation is indicated except in cases of fungous and tubercular arthritis, when all the diseased tissues must be removed and destroyed. In his later operations upon such cases, after cutting away the fungous masses as completely as possible, he has applied the hot iron, finding that the Paquelin thermo-cautery does not furnish enough heat to sterilize the tissues.

Elbow.—For the relief of ankylosis, Defontaine¹⁸ has, instead of excising the joint, made what he calls trochleiform osteotomy, cutting through the bone in such manner as to form a trochlea above and a corresponding cavity below, the result being very satisfactory, free motion in flexion and extension being secured.

In the discussion at a meeting of the N. Y. Surgical Society, Sands¹⁹ advocated partial excision when likely to effect the removal

of the tuberculous disease, and reported an excision for ankylosis in which healing was complete at the end of two weeks. Gerster advised active rather than passive motion, and urged the necessity of great care in and attention to the after-treatment. A curious case is reported by Gant,²⁰ observed at the Royal Free Hospital, in which, four months after excision and six weeks after apparent recovery, extensive venous hæmorrhage occurred in the forearm, necessitating amputation.

Wrist.—Gangolphe²¹ advocates excision in cases of tuberculous disease of the wrist in adults, with thorough removal of all fungous masses and the subsequent application of the hot iron, iodoform being employed in the after-treatment, which must be carried out with great thoroughness. To prevent displacement of the hand, a wire gauze splint is to be worn for a long time. If fever and cachexia be present, amputation should be done and not excision, and it is regarded as the preferable operation when there is tubercular disease of the lungs. In children, formal excisions are not to be made, but



DEFONTAINE'S OPERATION.—(*Revue de Chirurgie.*)

the parts thoroughly scraped and the hot iron applied. Dudon²² showed to the Bordeaux Medical Society a successful complete excision for chronic osteo-arthritis, pronation, supination and flexion of the fingers being perfect, but extension somewhat limited. The extensor tendons were divided and not reunited in the operation, though the soft tissues were carefully sutured.

Hip.—Bolling has in four cases dispensed with the drainage tube, allowing the cavity to fill with blood, after the method of Schede, and thinks such course the preferable one, even in tuber-

culous subjects, since it protects against the formation of fistulae from the presence of the drainage-tube. Whitman,²³ reporting four cases, directs that if the first operation fails to remove all active and latent disease, the wound "should again and again be



ROBERTS' OPERATION FOR EX-
CISION OF THE HIP-JOINT.
—(*New York Medical Journal*.)

explored in the hope of final success," and if such persistent efforts fail, "amputation should be undertaken as a last resort." In the discussion upon Whitman's paper, Cabot advised the open treatment of the operation wound, "packing it lightly with iodoform gauze." M. J. Roberts²¹ has devised a "rapid and easy method of excision of the hip-joint," cutting in much the usual way down upon the neck and upper part of the femur, separating the soft parts for a short distance around the bone at the place of section, introducing curved steel retractors to protect the soft parts, cutting through the periosteum and bone with his electrical osteotome, then splitting the periosteum in the line of the external incision, elevating it from the bone and removing the latter. According to Kernisson, Ollier²⁵ regards an anterior plaster of Paris splint without extension, as sufficient for a first dressing. Koenig simply keeps the patient in bed, using weight and pulley extension for five weeks, after which time he is allowed to get up on crutches, extension at night being, however, kept up for a year at least.

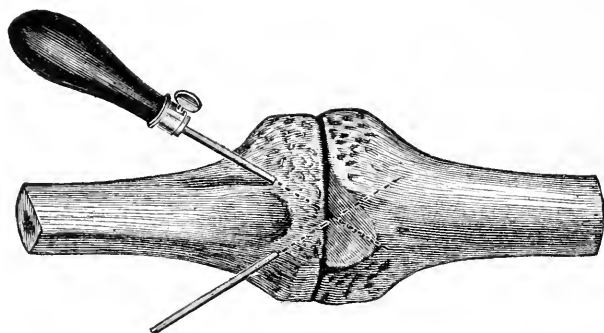
Knee.—Lucas-Championnière²⁶ has reported eighteen cases of this operation without a death (a later amputation being done in one), and considers at much length the indications for the operation and the best method of its performance. The rigorous employment of antiseptic measures is held to be of the utmost

importance, and slow, careful and thorough removal of the diseased structures is insisted upon. The apposed bone surfaces are united by catgut, as also the skin flaps; lateral and posterior drainage is provided for, hard rubber drains being preferred; the primary dressing is early removed, never being allowed to remain beyond the third day. In this latter point he differs widely from Ollier, who strongly favors delay (in one case leaving it in place for fifty-five days), and holds that if the wound is protected from infection at the time of the operation, complete primary consolidation may be expected to take place under it. Championnière objects to long retention of the drainage-tubes, since suppuration may occur along their tracks. Stoker, who follows Championnière in taking much time and care in doing the operation, puts off change of the original dressing so long as the thermometer indicates that every thing is progressing well with the wound. As already noticed respecting excisions in general, such operation at this joint is generally opposed when the patient is a child; but Stoker is somewhat favorably disposed toward its performance, and thinks that even the removal of the epiphyseal line is not certain to be followed by great and increasing shortening, as compensatory growth may take place at the upper line. In adults over 40, Boeckel finds that the operation is usually a failure, obstinate fistulæ remaining; and Duret and Banks, as a rule, advise amputation in patients of such age. Upon laboring men both Gerster²⁷ and Banks²⁸ would operate early, the propriety of excision, according to the latter, depending upon the amount of suppuration, the lapse of time, and the inability to work. Banks further thinks that the patient should be able to resume his occupation in from four to eight months after the operation.

No one of the various methods of opening the joint seems to be especially favored, Championnière making a transverse incision below the patella, Gerster a similar incision across the patella, and Banks a horse-shoe flap. II. Allingham²⁹ has described "a new method." in which the articulation is entered through a longitudinal incision passing through the patella,—a method of operating previously suggested by Ollier. After the necessary removal of the joint structures has been effected, the two parts of the patella, if not much diseased, are brought together and sutured. Ready access to all parts of the joint is afforded, and firm union of the

patella is more readily and certainly secured than when the bone has been divided transversely. Rovex and Riedinger have operated after this method.

Tilney has suggested separating by the chisel the tuberosity of the tibia with the attached *lig. patellæ*, and then the epicondyles of the femur with the lateral ligaments, the detached parts being later replaced and secured by ivory pegs. To properly hold together the apposed bone surfaces, catgut (Morton, Championnière, Packard), wire (Ollier, Stoker), steel pins (Baker, Gerster), bone drills (Wyeth, Murdoch), steel screws (Wight), and bone pegs (Marsh), are employed; catgut and bone-pegs not necessitating removal, as also the wire, if cut short and hammered down. The bones may be cut "on the round" (Banks) with a tibial

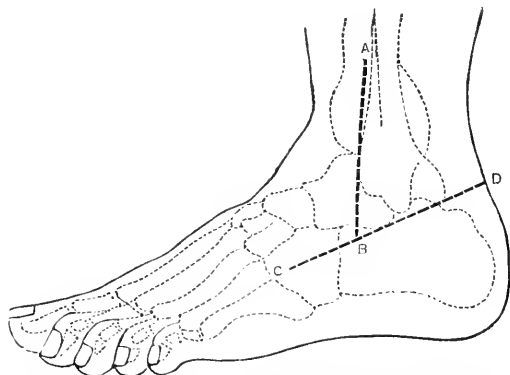


BAKER'S PINS TO HOLD BONE SURFACES IN APPPOSITION.—(*British Medical Journal*.)

(McLeod), or femoral (Davy) wedge, or with an anterior projecting edge on each bone so as to give the limb a slight bend at the knee (Packard). Ollier and Banks favor removal of the patella. The retention splints may be of pasteboard with children, or of plaster of Paris, of wire or of wood with adults, some form of supporting apparatus being worn for many months, at least a year according to Boeckel. Chiene at first contents himself with weight and pulley extension.

W. Morratt Baker³⁰ thinks that after-curvature is often due to irregularity of growth rather than to a giving way at the line of osseous union. Boeckel³¹ has once been compelled to make a secondary cuneiform excision to correct an angular flexion following the primary operation. Of Gerster's twelve excisions for tubercular disease one terminated fatally from meningeal tuberculosis.

Ankle.—Moreau, in a case of vicious callus following fracture of the internal malleolus, the ankle motions being unaffected though the deformity was decided, removed the callus, divided the fibula, straightened the foot and secured a satisfactory result. Wyeth³² recommends an incision from a point two inches above the tip of the internal malleolus down to and around the malleolus and forward from 1 to 1½ inches along the line of the first metatarsal bone, together with an L shaped incision upon the fibular side of the foot. After removal of the articulating surfaces, together with the astragalus, the sawn surfaces of the os calcis and the tibia are to be fastened by a bone drill, to be removed in about a month. The patient should use crutches for a year, during which time no weight should be allowed to be placed upon the foot. In Kocher's operation the incision is made from the edge of the tendo-Achilles under the external malleolus to the extensor tendons; the peroneal tendons are divided, the joint opened and the foot dislocated inward. After removal of the diseased tissues the foot is to be placed in position and the tendons sutured.

GIRARD'S OPERATION.—(*Centralblatt für Chirurgie*)

Zesas³³ calls attention to a method adopted by Girard (a combination of the methods of Vogt, Reverdin and Kocher) which gives free access to the joint and its surroundings and is of value in operating upon cases of extensive tuberculous disease. An incision begins above the ankle over the tibio-fibular line and passes obliquely down to the apex of the external malleolus. Another horizontal incision (the foot being placed at a right angle with the leg) passes from the outer edge of the tendo-Achilles, just beneath the external malleolus and forward to the tendon of the peroneus tertius. Dissecting back the flaps, the joint is opened and the astragalus removed. The foot is then dislocated inward and turned over, and all diseased parts removed. The divided tendons are then sutured, drainage-tubes introduced (a counter-opening being made

over the internal malleolus) and the wound closed. This method is favored by Heydenreich in cases in which the disease or injury is extensive and extends well up on the leg.

Foot.—Wheeler and Curly³⁴ reported to the Surgical Section of the Academy of Medicine in Ireland favorable results in excisions of the bones of the foot. In the discussion upon Wheeler's paper, Stokes referred to the liability of local return of tubercular disease in individuals thus treated,—a liability, however, that in very many cases can be attributed directly to incomplete primary removal of the diseased structures. Ollier³⁵ has expressed himself in favor of conservative operations upon the foot even in cases of tubercular disease, especially in young subjects whose lungs are unaffected, provided only that there be thorough removal of the local affection. Link has reported a case of excision of the anterior tarsus with scooping out of the astragalus, in which recovery with useful foot took place in six weeks.

Osteoplastic Resection (Wladimiroff-Mikulicz operation.)—Three papers have been published upon this subject by Fenger³⁶ and Hopkins³⁷ in this country and Chauvel³⁸ in France; successful operations having been performed by Fenger and Hopkins.

In the 24 cases collected and tabulated, most of them of caries, there have been 4 relapses (in 2 of which amputation was resorted to and in 2 later and more extensive removals of the foot and leg bones), and in 1 case gangrene necessitating amputation, the results in the remaining 19 cases being satisfactory, though later 2 of the patients died of pulmonary tuberculosis. The operation is indicated when there has been extensive ulceration of the skin of the foot and particularly of the heel. Incisions are to be so made as to preserve as far as possible the posterior tibial artery and its branches, and the extensor tendons. Hopkins sutured the tendo-Achilles to the plantar fascia, stitched together the retrenched ends of the peroneus longus tendon and those of the posterior tibial nerve, and fastened the apposed bone surfaces with sterilized bone pins.

Fenger advises the use of the bone suture.

Resection of the Ribs.—Lamelongue,³⁹ in cases of subdiaphragmatic perihepatic abscess, of certain hepatic abscesses, and of hydatid cysts pressing upward under the diaphragm, would excise the overlying ribs and cartilages; and reports a case of tubercular

subdiaphragmatic abscess in which (to allow of the filling up of the cavity between the rigid thoracic wall and the movable liver) he removed the fused cartilages of the lower ribs and the inner part of the 6th, 7th and 8th ribs through an extent of nearly three inches.

Resection of the Sternum.—Rustizky, in a case of retro-sternal abscess, resected the manubrium and the upper half of the corpus sterni. Under antiseptic treatment the wound healed kindly, and a tough cicatrix took the place of the removed bone.

TABIC ARTHROPATHY.

The relationship between Charcot's disease and chronic rheumatoid arthritis was discussed at the meeting of the Berlin Medical Society, November 17th, 1886,⁴⁰ and considered at much length in the lately published report of the Special Committee of the Clinical Society of London, Sir James Paget, Chairman.⁴¹

Virchow, having regard to the pathological changes observed in the joint structures, was not disposed to regard them as due to any direct nervous influence, but looked upon the tabes as only a predisposing cause acting in an indirect manner, holding that the usual causes of joint disease, mechanical and thermal, were sufficient to produce the alterations. Though at times the joint-trouble was due to congenital or early luxation, to fractures in the vicinity, or to syphilis, arthritis deformans was the disease that should always be kept in mind; from which the tabic arthropathy differed simply in the rapidity with which the changes are brought about, due, as he believes, to the general impaired nutrition characteristic of patients suffering from tabes. Rotter held that the specific nature of the affection was indicated by its clinical history, in being acute, in the ulceration much exceeding the new growth, in the absence of the symptoms of inflammation, in the prodromal appearances, in the peculiar swelling and in the rapid destruction of the joint. Sonnenburg regarded it as specific, due to direct nervous influence, and Bernhardt held, with Rotter, that clinically at least it is different from arthritis deformans. Koenig called attention to the case with which fractures of the vertebral column may occur in tabetics, the osseous friability being by Volkmann attributed to an alteration in the internal structure of the bones. Westphal had traced nerve-degeneration into the small branches

entering the joints and the nerve running with the nutrient artery of the tibia. In all the large joints Jürgens had found congestion and relaxation of ligaments, but had seen the same in certain cases of mental disease, chorea, etc.

The Clinical Society Committee reported that (1) "although there are resemblances between the local results of the two diseases, (Charcot's disease and osteo-arthritis), there are differences in the distribution, mode of onset, condition as regards pain, and the rapidity of the disorganization, and that these differences amply warrant the separation of tabic arthropathy from the group of joint diseases commonly known as chronic rheumatic arthritis." (2) That "the occurrence of the joint lesions may bring the subjects of them under medical observation at an earlier date than happens with cases of locomotor ataxy which are not complicated by so startling an accident." (3) That while tabic symptoms are rarely found associated with typical osteo-arthritis, "we can see no reason why true osteo-arthritis should not sometimes affect patients suffering from locomotor ataxy."

OSTEO-TUBERCULOSIS.

Treatment.—Occurring in children, Volkmann⁴² has found tuberculous diseases of bones and joints much more apt to recede without suppuration than in adults; and when abscess has formed Gibney⁴³ urges that attention should always be paid to the diseased bone or joint, by immobilization, rest and protection of the parts, after which it will make but little difference what course is pursued with reference to the abscess itself. De Rossi and Ferreri⁴⁴ strongly advise sea-bathing, finding that at the Italian sea-side hospitals cure or marked improvement often takes place in children whose condition had been thought to be hopeless. Operative interference is very likely to be followed by recurrence of the disease, either in the vicinity or in distant parts. In adults the same is true, though in less degree. Any operation, arthrectomy, excision or amputation, if it is to succeed, must thoroughly remove all tubercular foci. How easily such may escape observation is illustrated by a case of Steltzer's (seen and reported by Senn⁴⁵) in which, after removal of a diseased ankle joint, further exploration of the medullary cavity of the tibia showed scattered masses of tubercle nearly as high up as the upper epiphyseal line.

Lannelongue⁴⁶ calls attention to the involvement of arteries in cases of cold tuberculous abscess and the liability to resulting ulceration and hæmorrhage. Thorough scraping away of the medulla has at times proved to be curative, as in a case reported by Fenwick. That coexisting lung tuberculosis is not a contra-indication to amputation has been shown by Pilcher, Verneuil, Moof and others; although it has not seldom been found that though the lung disease improves, there rapidly develops tubercular disease in some other part of the skeleton, especially the vertebræ and at times the ribs. Notwithstanding his large experience, Volkmann (according to Senn), while strongly urging operations upon tuberculous bones and joints, thinks that the time has not yet arrived when a decisive answer can be given respecting their prevention of general tuberculosis.

If after either arthrectomy or excision, tuberculization of the wound and fistulous tracts takes place, Volkmann urges new scrapings, cauterizations and iodoform tamponing. Brachini has so successfully treated a diseased elbow by thorough cauterization with the Paquelin instrument that there was complete restoration of the functions of the joint. Matto, of Lima, advises in the treatment of this joint (the elbow) the use by injection of 10 per cent. iodoform-ether. At the wrist massage is highly commended by Niehaus, who has in four cases secured good functional results, after between three and twenty months continuance of the treatment. Kolischer has reported decided success following the treatment of localized tuberculous deposits by direct injections of an acid solution of calcium phosphate (6.1-2 per cent.) containing 1-1000th part of free phosphoric acid. The pain at first is but slight, but soon becomes severe, lasting several hours and to be controlled by morphia hypodermically. Antiseptic dressings are to be applied, and after the subsidence of the reaction fever, which is severe and of from 12 to 24 hours duration, the limb is to be immobilized. At the end of from three to six weeks, massage and passive movements are to be commenced. The cure results from the breaking down and calcification of the tuberculous masses and later cicatrization.

INFLAMMATION OF BONE.

In acute osteomyelitis, generally admitted at the present time to be of microbial origin, it would appear from the investigations

of Kraské¹⁷ that not only may the ordinary staphylococcus pyogenes aureus be found, but also the albus, the streptococcus pyogenes and bacilli, and the cases in which several of these organisms are present are the more severe. In many cases the bone inflammation follows and is consequent upon a primary inflammatory focus in the skin or the subcutaneous tissue. Both Lamelongue and Petit¹⁸ have found such in osseous parais. The organisms may find entrance through the respiratory tract, and Kraské notices the not infrequent occurrence of pneumonia in advance of the bone disease. That deposition of the organisms should take place in the medulla is what might be expected from the slowing down of the circulation due to the large size of the capillaries during the period of bone-growth, and it is during this period that acute osteomyelitis generally occurs. Adults who are the subjects of this disease, it will ordinarily be found, have in youth had typical osteomyelitis, one attack rendering the tissues specially favorable to reinfection, even after long periods of time. As indicating how quickly death may occur, Reynier¹⁹ reports a youth of 18, the disease affecting the upper end of the femur, who died on the fourth day, before the occurrence of suppuration. Cultures of the bone-medulla demonstrated the presence of the staphylococcus pyogenes aureus. Kohts²⁰ holds that fatal termination may take place within 24 to 48 hours, as happened in one of his own cases, a child $3\frac{1}{2}$ years old. Though unquestionably many cases of so-called chronic osteomyelitis are of bone-tuberculosis, Trélat²¹ maintains that the two diseases are not the same, that they may coexist, and that there is still wanting the elements necessary to the establishment of the differential diagnosis. Bouilly would find indications for such diagnosis in the appearance of the opening of the fistulous tract, which in osteomyelitis is that of healthy granulations, the surrounding bone being hard and resistant, while in tuberculous disease the granulations are flabby and the bone softened. Renken, in the examination of the granulation tissue of four cases of spina ventosa, found tubercle bacilli in each, though in small number, such bacilli inducing tuberculosis in guinea pigs inoculated with the granulation tissue.

D'Antona,²² at the Fourth Congress of Italian Surgeons, declared his belief that 95 per cent. of the chronic diseases of bones and synovial membranes are of tuberculous nature. Durante, while

accepting the fact that tuberculosis is generally the cause, maintained that there is a form of fungous inflammation of bones and joints that is not tubercular, to be recognized by its slower progress, by a less degree of atrophy of the limb, by the more advanced age of the patients (who are never young), by the absence of all scrofulous symptoms and by there being no general infection; caseous degenerations do not occur and bacilli cannot be discovered.

In the osteo-periostitis and periostitis following typhoid fever, Bourgeois insists that the disease usually terminates in recovery, and Mollière⁵³ agrees with him. Even prolonged suppuration does not seem to seriously affect the general health, the prognosis being gravest when the jaws are the seat of the disease. The tibia, femur, humerus, ulna and maxilla are attacked in that order of frequency, not seldom several bones being affected at the same time; the disease is located upon the left more often than the right side, and young adolescents are particularly liable to be attacked. Slight traumatisms are sufficient to develop the disease and the influence of cold is decided. When the osteitis is in the lower end of the femur, Mollière has found that the sequestrum is always superficial, while in the humerus, the tibia and the forearm there is an associated osteomyelitis which usually necessitates trephining.

Non-tubercular suppurative inflammation of the lower end of the femur is likely to be followed by deformity and ankylosis. Swelling around the malleoli due to the presence of pus in the popliteal space is a diagnostic sign of much value. Reclus⁵⁴ has reported a case of supposed disease of the fifth metatarsal bone, in which he found that there was diffused osteomyelitis of the os calcis, astragalus, cuboid and fourth metatarsal, together with the fifth. Noticing the rarity of osteomyelitis in the short bones, he regards such lesions of the spongy bones, in which the osseous tissue is softened, the areolæ enlarged and the trabeculæ decalcified, as a special alteration of bone, the histology of which has not as yet been worked up. Lyall has reported a case of acute necrosis of the tibia following rheumatic fever. Clark and R. Parker have each met with an acute myositis, the clinical features of which were the same as those of periostitis. Clark's patient died on the ninth day.

In the treatment of osteomyelitis of a long bone, Tscherning,

as reported by Fr. Ecklund, Corresponding Editor of the ANNUAL, advises making one or two openings into the bone and through them scraping out the medulla, with subsequent drainage. Macnamara has not found drainage satisfactory in acute osteitis of the head and neck of the femur in young subjects, and he therefore advises early excision. An acute traumatic osteomyelitis of the humerus was successfully treated by Thos. Jones by early trephining. In a case of Koenig's in which he opened up the tibia and the ankle joint and incised and drained the knee, no improvement followed and the limb was amputated. Complete necrosis of the lower jaw, extremely rare except as produced by phosphorus poisoning, was seen by Koehler to follow a subacute periostitis.

Bone-grafts.—Poncet, in a case of pseudarthrosis of the leg, transplanted one-half of the first phalanx of the great toe taken from a leg removed some hours before. The graft adhered to the lower fragment and covered in with healthy granulations. Sixty-two days later, as there was yet movement at the seat of fracture, the graft was removed, and was found to have undergone no absorption. In a child, æt. 11, from whom the tibia had been removed on account of osteomyelitis, he introduced bone fragments taken from a newborn child just dead. Later, four fragments from a young kid were inserted, three of which adhered. Six months afterwards bone had reformed to the extent of twelve inches and the child became able to walk. He directs that the grafts be small. Lannelongue⁵⁵ found in experiments upon rabbits that bone-grafts were absorbed. In an East Indian case of pseudarthrosis of both bones of the forearm, the pointed fragments of the ulna were cut off and placed behind the freshened ends of the shaft; they were thought to have been of service in securing union. Marshall, of Chicago, used a dozen small pieces of the femur of a rabbit to close up a gap in the lower jaw left after operation for osteo-sarcoma; the recovery was prompt.

Bone Growth.—Macewen⁵⁶ holds that the osteogenetic factor in the development and repair of bone is not the periosteum but the bone itself, declaring that "bone is produced and regenerated by proliferation of osteoblasts and its development and reproduction can take place independently of the medulla and periosteum." Bell⁵⁷ reported to the Montreal Medico-Chirurgical Society a reamputation of the thigh in which the removed specimen showed

what was regarded as a development of bone from the periosteum detached at the time of the first amputation made twenty-five days before. Lengthening of the tibia, the result of chronic osteo-periostitis, was noticed in a case of Goodman's. Helferich has shown that increased growth can be induced by artificially produced passive hyperæmia. As a result of fastening rubber-tubing around the arm in a case of delayed union in the forearm, callus formed and firm union followed. The process is not applicable after operations for tubercular and malignant disease, as venous congestion unfavorably affects such wounds. Numerous cases are reported of extensive reproduction after the removal of necrosed bone, even to the extent of the entire shaft of the tibia.

Goetz claims that the regeneration of bone after removal of large pieces of the skull may be quite considerable, and puts in evidence four cases observed at Bruns' clinic.

PSEUDARTHROSIS.

In children it would seem, from Nepveu's investigations (twelve cases), that this condition is unamenable to treatment other than amputation. In a case affecting the lower jaw following resection, Richelot successfully excised the callus and fastened the fragments together with a bone-peg. In a case of Weinlechner's, in which the ends of the fragments of the humerus were exposed and wired, solid union was not secured until the expiration of five months. Berger,⁵⁸ in a lengthy article upon pseudarthrosis, reviews the statistics and considers the causes of the frequent failure of operations and the resulting deaths, and advises the removal of a double cuneiform piece of the ends of the fragments and their fixation by metallic threads, preferably of platinum, flattened down and left *in situ*,—all done under strict antisepsis. In one of two cases thus treated suppuration occurred and the wire with a necrosed piece of bone was ultimately thrown off.

Osteoma.—Sprengel reports successful removal of an osteoma of the ethmoid, the diagnosis being based upon the symptoms described by Bornhaupt, viz., growth from the neighborhood of the inner canthus, lateral displacement of the eyeball and non-involvement of the upper and lower orbital ridges.

Malignant Disease.—Helferich, Bergmann and Israel have reported cases in which osteo-sarcoma was secondary to malignant

disease of the kidney. Sloan reports a successful removal of the entire clavicle for central sarcoma, and Symonds of the scapula. In Cheever's case of osteo-sarcoma of the scapula the patient died of shock. Southam exsected the head and four inches of the shaft of the humerus and recovery followed, the disease being strictly limited to the parts removed. In a case of Poncet's at the Hôtel Dieu of Lyons, in which there was osteo-sarcoma of the lower end of the femur, the temperature rose as high as 104° F., with decided difference in the heat of the two thighs, the diseased one being the hotter by from $3\frac{1}{2}$ to $5\frac{1}{2}^{\circ}$. Marked elevation of temperature in cases of sarcoma has been not infrequently noticed.

Echinococcus.—V. Bergmann reports a case in which the left tibia had been enlarged for six years. Fracture occurred from sudden turning. A week later a soft fluctuating tumor was discovered at the seat of fracture, upon incising which a thick yellowish-green puriform material escaped and in the bone were found a number of small echinococcus cysts. Amputation was performed and recovery followed. Upon inspection the medullary cavity was found enlarged and filled with cysts throughout its entire length. The presence of cholesterol crystals in the pus is regarded as of diagnostic value.

Osteo-malacia.—Lamb⁵⁹ reported to the District of Columbia Medical Society, a case affecting the left lower extremity, of nearly two years' development, for which no cause could be ascertained. Comby⁶⁰ reported to the Société de Med. des Hôpitaux a case associated with dilatation of the stomach, in which the bone changes were believed to be due to excessive formation of lactic and acetic acid in the alimentary canal.

Abnormal Development.—In an ataxic subject having bilateral hypertrophic arthritis of the hip, Guinon found ossification of the periarticular muscles, due, as he believed, to the patient's inability to move because of long standing paralysis. Bennett⁶¹ exhibited to the Academy of Medicine in Ireland a specimen of ossification of the upper half of the capsule of the shoulder-joint, probably consequent upon an extensive burn and resulting cicatrix. Hartmann⁶² presented to the Anatomical Society of Paris a clavicle in which the conoid and trapezoid ligaments were completely ossified. At a meeting of the New York Surgical Society, a patient was shown by Abbe⁶³ in whom large bony plates occupied the site of

the lower halves of the left vastus internus and externus, which had been developing for forty years. Helferich, Corresponding Editor of the ANNUAL, reports a case of myositis ossificans.

Sequestra.—As a means of getting rid of sequestra, Andrews⁶⁴ advises the employment of continuous or frequently repeated irrigations of weak solutions of hydrochloric acid ($\frac{1}{16}$ to $\frac{1}{4}$ of the strength of the officinal dilute acid), which he claims will accomplish the purpose without damaging healthy tissue. The average time required for the dissolving of bone outside the body, as determined by twelve experiments, was about 95 hours. After the removal of large sequestra in individuals somewhat advanced in age, Lange advises to fill up the cavity by inversion of soft parts, best taken from the anterior surface of the thigh when it is the femur that has been operated upon; such flaps to be fixed in position and a compressing antiseptic bandage applied, to be changed on the second day and then left for one or more weeks, when healing will probably have taken place.

Osteoplastic Periostitis.—Paulat,⁶⁵ of the French Army, reports having observed eight cases of osteoplastic periostitis of the metatarsal bones consequent upon marching, the first symptom being swelling of the overlying soft parts, lasting for from ten to thirty days, and followed by unmistakable evidences of periostitis. Rest is essential to relief. The disease lasts at least a month, and the soldier is unfitted for marching for many months. The disease is attributed to shoe-pressure, a ridge in the sole pressing against the foot just back of the heads of the metatarsals.

Albuminous Periostitis.—Roser⁶⁶ regards it as a mistake to create, with Ollier, a new species of periostitis on account of the presence of a serous exudation, inasmuch as he has found such exudation in connection with pseudo-rheumatic osteitis and tubercular periostitis, and thinks that the presence in certain cases of serum or bloody serum containing fat globules is not sufficient to place on a firm basis the doctrine of a special periostitis albuminosa.

JOINTS.

Foreign Bodies.—Rochard, Condamin and Poncet have reported cases of successful removal of true traumatic foreign bodies in the knee-joint, *i.e.*, portions of healthy articular surface detached by a blow. Nearly all such bodies come from the tibia,

probably from the internal tuberosity, and the cases are to be distinguished from the much more common detachment of growths previously existing and due to arthritis deformans. Boeckel⁶⁷ reports removal of a body of such nature from the elbow, as also of a pedunculated fatty tumor from the synovial fringe of the knee joint and a fibro-cartilaginous mass from the same joint; and points out the strong probability that the removal of such foreign body will not be followed by restoration of the full integrity of the joint. Annandale reports eight cases of "internal derangement of the knee-joint," 4 being of displaced cartilages, 3 of growths from the joint and one of growth from bone. In cases of displaced semilunar cartilage, he opens the joint, brings the cartilage in place and fastens it with catgut sutures; for growths, if the articulation is not diseased, he opens the joint and removes the growth, chiseling it off if bony. The incision should be made directly over the growth if it can be felt; but if its exact position cannot be determined, the joint should be opened as for a displaced internal semilunar cartilage. Stabel, of Norway, has seen a separation of the patellar tuberosity of the tibia produced in jumping.

Purulent synovitis is by Duret⁶⁸ regarded as almost always of microbian origin, associated either with traumatism, inflammation in the vicinity, or general morbid states,—in chronic cases the organisms having been for a long time in the system or in the articular cavity. Arthrotomy he considers "an operation of urgency and necessity." In a case of Vanneufville's the suppurative inflammation of the knee was believed to be secondary to an abscess of the calf. Roser says that the same organism that produces osteomyelitis may also invade the synovial membrane and there excite acute serous or purulent exudations.

Fungous Synovitis.—Duret maintains that a distinction should be made between this condition and true tubercular arthritis, even though the tubercle bacillus may be found. Since its progress is much slower, it does not involve the bones and is not so directly connected with lung tuberculosis. It may and often does terminate in ankylosis, and luxations frequently occur. Its treatment is at first by rest, immobilization and compression; later thorough cauterization is of much value. Fungous osteo-arthritis is a more serious affection, often follows injuries, commences in the bone, and suppuration is very likely to occur. It may terminate in

ankylosis, usually incomplete. Arthrectomy is favored only in the smaller joints. Resections should not be made in patients over 35, and amputations should be resorted to when grave constitutional symptoms are present.

Gonorrhœal Arthritis.—Klippel,⁶⁹ in reporting two cases of this nature affecting the sterno-clavicular articulation, calls attention to the fact that the associated muscular atrophy was of the pectoralis major. Cheminade⁷⁰ finds that while ordinary blenor-rhagic arthritis is very rare in women, it is unattended with fever, the general symptoms are not well marked, and the knee is generally the joint affected. Yet there is occasionally met with in women an arthritis of such origin in which the general symptoms are severe, the fever high and the wrist and elbow the ordinary seats.

Syphilitic Arthritis.—According to Lannelongue,⁷¹ the diagnosis from tubercular disease is to be made by observation of the facts that there is no involvement of the joint itself, that the swelling affects the bone in its immediate vicinity, that there is an absence of muscular contractures limiting the movements of the joint, that the enlargement of the bone is diffused and general, and that there are present other evidences of syphilis.

Acute Epiphysitis of the Hip.—In the discussion upon a case presented by Gibney⁷² to the Surgical Section of the New York Academy of Medicine, Judson stated that there is no reflex muscular contraction and no rigidity of the joint, which are constant clinical features of hip disease; and that there is liability after recovery to being regarded as congenital luxation, there existing so much motion at the hip. Jacobi had found the course of the disease to be shortened by the internal administration of phosphorus.

Muscular Atrophy Associated with Bony Ankylosis of the Knee.—Klippel⁷³ reports a case of atrophy of the quadriceps extensor in which he found fatty degeneration of the fibres of the vasti, while those of the rectus were of normal color and showed striation, due as he believed to the fact that owing to its pelvic attachment, motion of the rectus still continued, while the vasti, attached as they were to the ankylosed bones, had remained for a long time absolutely without movement.

Joint Inflammation.—Grünberg,⁷⁴ in cases not dependent upon

constitutional causes, especially in chronic cases of traumatic origin, has successfully employed the thermo-cautery. In traumatic effusions into the knee-joint, Gubb, in advising compression, thinks it unnecessary to apply such over the whole joint, but only over the extensor cul-de-sac and over the lateral prolongations of the synovial membrane. From eight to ten days are required for absorption to take place. Hydrarthrosis has been successfully treated by irrigations of carbolic acid (2 to 5 per cent.) by Michalski, Terrillon, Reclus, Schwartz, Bouilly, and Culver. Farsac⁷⁵ reports favorably upon the treatment by blisters and the after application of mercurial ointment, having thus successfully treated nine cases. A hygroma of the iliac bursa communicating with the hip-joint was cured by Sprengel in five weeks by incision, injection and drainage. In false ankylosis, in which manual, not mechanical, force should be used, Norström directs that massage be always employed before, during and after the forcible straightening. G. Berne urges the use of methodical massage in cases of scapulo-humeral peri-arthritis, having in eight cases found such method of treatment quickly remedial. One séance a day of fifteen minutes' duration suffices in from twenty to thirty days to produce a permanent cure. In cases of paralytic dropped shoulder, Schüssler⁷⁶ opposes operative treatment as advised by Wolff, maintaining that electricity, massage, etc., will greatly improve the condition of the parts, provided that the replaced bones be held in position by bandaging, so that the normal relation of the muscles as to origin and insertion is preserved.

Sciatica Deformans.—Berbez⁷⁷ calls attention to the fact that in certain cases of sciatica there is produced a characteristic lateral curvature of the spine, due to the efforts made by position, to lessen or prevent pain, throwing the weight over upon the opposite limb and raising the shoulder of the affected side.

Traumatic Separation of the Upper Epiphysis of the Humerus.—Helferich, in a case of this nature, cut down upon and replaced the epiphysis and fixed it in position by a steel pin. Recovery took place with preservation of the normal movements of the shoulder. Décès, in old, unreduced luxations, advises arthrotomy and replacement.

Diseases of the Sacro-Iliac Junction.—Gant, in reporting two cases successfully treated by scraping, directs attention to the

diagnostic significance of prominence of the anterior superior iliac spine and its somewhat lower level.

PLASTIC SURGERY.

Skin Transplantations.—Thiersch's method is highly commended by many of the German surgeons, (Eversbach, Graser, Helferich, Rotter, and others), it having proved successful in the treatment of ulcers, of the large granulation surfaces after burns, of the gaps left in the removal of malignant growths, etc., Graser stating that he had failed only when operating on quite denuded bone or cartilage. Weak solutions of sodium chloride are used at the time of the operation and iodoform afterwards. Ceci,⁷⁸ at the last Congress of Italian Surgeons, reported and showed photographs of cases in which he had by transplantation improved great disfigurements of the face. Berger⁷⁹ urges, in cases of ulcers or vicious cicatrices, the transplantation of a flap taken from a distant part, immediately applied and fastened, but left adherent by a pedicle to its original site until full adhesion has taken place. Upon six patients thus treated he had made nine operations with eight successful results, sloughing of the flap occurring but once. In one case erysipelas developed, but the operation was a success, notwithstanding. Wagner, Helferich, and Schmidt reported to the last Congress of German Surgeons successful cases of transplantation of large flaps. Keetley,⁸⁰ in an infant less than two months old having a large hairy mole on the face, transferred it to the arm and put the arm flap in the face, making "transplantation by exchange." Obalinski (Cracow) has devised what he calls a "micro-plastic" operation which he thinks will often be found of great service. The flap taken from a distance is brought to the edge of the surface to be covered and there attached. When the union is firm a secondary flap is taken from it, placed in the desired position and retained until complete fusion has occurred. Bayer,⁸¹ of Prague, Corresponding Editor of the *ANNUAL*, has called attention to the fact that this is not a new operation, but one that has not seldom been performed, especially by the French, and was described by Roux.

Frog skin and rabbit skin have been employed as grafts. Vincent and Dubousquet-Laborderie⁸² report successful use of frog-skin; in the latter's case cicatrization occurred more rapidly than

in an associated wound upon which had been placed grafts taken from the patient's own body.

Tendon Transplantation.—Peyrot has twice made use of the flexor tendon of the dog to fill up a gap in the flexor tendon of the middle finger; in one case the result was satisfactory, in the other sloughing of the inserted tendon took place. Monod, in similar manner, transferred a rabbit tendon in a case of deficiency of the flexor tendon of the thumb and reports success, though the tendon died. Le Fort believes that the implanted tendon is always absorbed.

Tendon Suture.—Bernays reports that in a case of divided tendo-Achilles, after suturing the ends with catgut he was compelled to make subcutaneous myotomy of the calf muscles to permit of ready approximation of the edges of the wound. The muscle wound suppurated for a month. Ultimately the functions of the limb were completely restored.

Jones, of Manchester, England, in a three-months old case of division of the flexor tendon of the middle finger, having split the lower part of the proximal portion to within an eighth of an inch of its end, and turned down the separated piece, was able to attach it to the distal portion and restore the continuity of the tendon. A very perfect recovery followed.

Use of Photoxylin.—V. Wahl has found the use of a 5 per cent. solution of this agent to yield better results than collodion, since it is unaffected by fluids, is impermeable to them, makes equable compression and adheres to the skin for a long time. He recommends its employment in small operations, in those upon the face and external genitals, in children and in laparotomy.

Rhinoplasty.—Israel⁸³ has somewhat modified Koenig's method of performing osseous rhinoplasty, making the operation at two sittings. At the first the bone flap is formed and applied. The wound is then allowed to granulate and later lateral skin flaps are, by sliding, carried over upon the central one so, that when the operation is completed both the internal and external surfaces are covered with epidermis. In cases of defects of cheek and lip, Israel takes a flap from the neck, the insertion of which is so far from the margin of the defect that the bridge of tissue is sufficiently large to permit of later forming from it skin flaps to cover the granulating raw surface. Hardy, of Manchester, England,

according to Senn,⁸⁴ has had satisfactory results in three cases in which he transplanted the last phalanx of the left index finger for a bony support and covered it in with flaps taken from the left arm. In a case of elephantiasis, LeBec removed the soft parts, leaving the cartilaginous frame-work, and then covered the latter with a skin flap taken from the forearm. The result was not altogether successful, the superficial part of the flap drying up and being ultimately detached.

Hare-Lip and Cleft Palate.—Czerny⁸⁵ insists that the hare-lip fissure does not, as is generally held, pass, as a rule, outside the incisors, but between them, and if the canine appears next to the fissure, it is generally because the lateral incisor is wanting. Even when, in double hare-lip, the central prominence carries four teeth, it is often because supplemental incisors are present. When the fissure does pass between the external incisor and the canine, it will be found that the nasal cavity is not opened. Wolff reports that, having lately operated for cleft-palate on young children, he had found that the results in general were quite satisfactory and believes that the earlier the operation the better will be the speech. Clutton has had two successful operations upon children twelve months old, the cleft being wholly in the soft palate in one and extending for a slight distance into the hard palate in the other.

Hoffa has investigated the mortality rate of patients operated upon and finds, he believes, that the malformation itself has a great influence upon it. Of 114 hare-lip cases, 27 died (23.7 per cent.); of 111 subjects of complete fissure, 43 died (59 per cent.). The most favorable time for operating on hare-lip is, he states, from the second to the sixth month. Bolling holds that, though the mortality rate of children operated upon is high, it does not very greatly exceed that of young children in general. Where the fissure involves both the hard and soft palate, he always makes a single complete operation.

In Trendelenburg's clinic, according to Eigenbrodt, of twelve cases of simple hare-lip, one died ($8\frac{1}{3}$ per cent.), of three of double none died, of twenty-one of complicated single, two died ($9\frac{1}{2}$ per cent.), and of eight of double, four died (50 per cent.).

Wagner⁸⁶ reports favorable result of transplanting large flap from body to arm. Helferich and Schmidt had secured equally good results. Jüngst advocates the use of flaps taken from the

side of the body or some other distant part in the treatment of extensive cicatricial contractions of the hand, and later the employment, if necessary, of some mechanical appliance.

When there has been loss of the thumb, Guérmonprez proposes as a substitute the index finger, so loosened from its attachments as to be quite freely movable, and properly shortened by a resection of a part of the metatarsal bone and of the first phalanx.

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GUNSHOT AND PUNCTURED WOUNDS.

By HUNTER McGUIRE, M.D., LL.D.,

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WOUNDS OF THE HEAD.

DR. DENNIS¹ in an elaborate paper on "compound fractures of the skull, with special reference to trephining in gunshot injuries," divides such lesions into non-penetrating and penetrating. In the first class the wound is dressed antiseptically, a cautious prognosis given, and the patient kept under observation for two weeks. In the second class, when cerebral symptoms are present, operative interference is demanded: since antiseptics have been introduced and generally accepted, trephining has become more common. The operation of trephining is divided into five stages: (1) incision to fracture; (2) applications of trephine; (3) removal of cause of compression; (4) burnishing of edges; (5) dressing wound. He regards as important, smoothing and burnishing the upper and lower edges of the opening in the bone. Circumscribed traumatic meningitis may ensue if the sharp rim of bone is left. The trephine is used to elevate depressed bone, to remove the bullet and arrest hæmorrhage, and to prevent irritation, epilepsy, inflammation and the pathological conditions which follow. If the missile is deeply imbedded, it will be better to let it alone. Probing provokes further mischief. The possibility of a surface clot by *contre-coup*, denied by some surgeons, is demonstrated by two cases occurring in his practice.

M. Berra² of the Argentine Republic reports the case of a young man shot through the forehead: brain substance escaped; a sound introduced touched a hard body at a considerable depth: symptoms leading to the fear of encephalitis supervened. No operation was done. In six weeks the man was well; six months after was in perfect health.

M. Verneuil knows two patients, each of whom have a revolver bullet in the skull and are none the worse for it. He thinks

when the bullet is small, the wound recent, and disinfected, it should be let alone. M. Sée has seen similar cases; he reports the case of a man who shot three bullets into his skull, with no other accident but paralysis of the optic nerve; the man is now alive and in health.

M. Reclus thinks that immediate occlusion of the wound, without operation, should be the rule. In the war at Tonkin and Formosa, the mortality from penetrating wounds of the head by bullets was only 10 per cent.; and in the War of Secession in America it was 60 per cent.

Dr. C. W. De Lannoy³ reports a case where Professor Bell's induction balance was used to locate a bullet, lodged in the brain of a young girl. The tests were made by Dr. Girdner, of New York, in the presence of 12 physicians; the trephine was used, but the bullet not found. In concluding the report, Dr. De Lannoy says that while the opinion of the general public deduced from this case was largely against the usefulness of the induction balance as a means of locating the bullet in the patient's brain, that none of the physicians present at the post-mortem could deny that the induction balance had correctly located the foreign body, but that it had afterwards fallen from that position to the floor of the skull.

H. C. Dalton⁴ reports a case of punctured wound of the brain. A knife-blade entered the temple at right angles $\frac{3}{4}$ of an inch behind the external canthus of the right eye, and was buried fully two inches; there seems no doubt that it penetrated the brain. The wound was dressed antiseptically, and no further explorations made; ice-bags were applied to the head and purgatives and morphia given; recovery was slow, but it was thought complete.

Dr. Moullin⁵ reports a case of bullet-wound of the head; the ball entered on right side of the forehead, $1\frac{1}{2}$ inches behind and a little above the external angle of the orbit; a probe was introduced 3 inches and there was no doubt that the bullet had gone into the frontal lobes; no paralysis, loss of sensation, or unconsciousness; localized tenderness, intense and well defined, existed on opposite side of the head. Lint dipped in lead lotion was applied to the wound; the man made a good recovery.

Dr. Rankin⁶ gives the details of a case of pistol shot wound

of the brain; ball entered the upper and central portions of right parietal bone, passed downwards and backwards two inches or more; cerebral symptoms were prominent, but patient recovered completely.

Dr. Wilson⁷ records a case of punctured wound of the brain, where a copper paper file penetrated the right side of the occipital bone near its juncture with the petrous portion of the temporal bone, and passed for more than three inches into the brain; profound collapse with stertorous breathing followed; the recovery was complete.

Fatal cases after punctured wounds of the brain are not generally related. Recoveries are exceptional and as such are reported.

WOUNDS OF THE SPINE.

Dr. Douglass⁸ reports a case of a pistol shot wound of the spine. The bullet entered the back a little to the left of, and on a line with the tenth dorsal vertebra, and embedded itself in the body of the twelfth dorsal vertebra. Three days after the injury an attempt to find the bullet was made; the track of the ball was followed to a point between the last dorsal and first lumbar vertebræ, and one of the transverse processes was removed, but the bullet could not be found; the patient died nearly four months after the injury. A large diffuse abscess was found extending from the base of the left kidney through the left psoas and internal iliac muscles. Numerous small multiple abscesses in both kidneys.

The operation of trephining the spine has been repeatedly performed. It is doubtful whether there is on record one well authenticated case of recovery.

Dr. Lamb⁹ gave the history of a case of shot wound of the lumbar spine, May, 1864, the ball lodging in the canal and removed after death, 18.5 years afterwards; after a tedious illness the man recovered sufficiently to fill a position as clerk in one of the departments in Washington, in 1865; was married in 1873. He suffered with occasional severe pains, and motion and sensation of lower limbs were impaired.

Robt. W. Walsh¹⁰ records the case of a boy wounded with a pair of scissors in the third dorsal region, a little to the left of median line. Sickness and vomiting soon after followed; upon examination his shirt and under-vest were found wet with fluid of

some kind. A probe was passed in the direction of the spinal canal, and the wound was closed with lint and collodion. The next day the wound reopened, his shirt and vest were again wet through with clear watery fluid; violent vomiting again came on. The wound was now united by sutures and the boy soon recovered.

WOUNDS OF THE CHEST, LUNGS AND HEART.

Bullet wounds of the chest are, in civil life, comparatively rare. Hence any facts which may lead to a correct diagnosis or favorable prognosis of such wounds are of interest and importance. In looking over the literature of the past year, we find that surgeons are still divided as to the two modes of treatment, *i.e.*, whether to treat such accidents as open wounds, by drainage, or as closed wounds, thereby preventing the entrance of germs. The tendency now, however, is to drain freely and even to make counter incisions at the most dependent part; no empirical rule can be laid down, because there are always questions arising in the diagnosis, which demand special methods. For example: Is the wound confined to the wall of the thorax? Is the pleural cavity opened? Is the lung substance involved? Is there hæmorrhage or hernia of the lung? It must be confessed that no new point of diagnostic importance has been presented; indeed the literature has been very meagre.

M. Croft¹¹ reports the case of a man who shot himself in the second intercostal space of the left side, just internal to the nipple line. The tissues around the wound were emphysematous, which on forced respiration was increased; in fact it soon extended as far as the pubes and along the neck. On examining the back, the bullet was found over the vertebral border of the scapula. There was some cough with bright red sputa. The patient was given ice to suck, and the front and side of the chest covered with ice bags. It was determined to remove the bullet, and ten minutes before the operation an injection of cocaine (1.20) was given subcutaneously: an incision was made over the bullet, which was easily removed, and the wound dressed; thirty-eight days after the patient was shot, he was allowed to walk about, the wound nearly healed, the emphysema over the abdomen, chest and neck, quite gone.

Dr. Wyeth¹² has reported an interesting case of a man who,

after being stabbed three times in the apex of the left lung, was operated upon for empyema. Pus was removed three separate times, but there was always a fistula. As the patient's health was gradually failing, he consulted Dr. Wyeth who found a circumscribed empyema, 6 by 4 in. and 2 in. deep. It was found that the incision had failed to give complete relief because the ribs closed against the opening immediately after the pus was withdrawn and prevented proper drainage. Dr. Wyeth excised 2 in. of one rib and carried in a stiff drainage-tube which reached to the bottom of the cavity. Dr. Wyeth used the stiff rubber tubes, side by side, so that the cavity could be easily washed out with a bichloride of mercury solution (1.3000-1.500). Koenig¹³ states that of 452 wounds of the heart, 36 recovered, as the post-mortems showed. Wounds of the auricles are more dangerous than those of the ventricles, and the left offers better chance of life than the right; the least dangerous are those of the apex and septum. It is a popular belief that all heart wounds prove instantly fatal; the above statistics proves this not to be true, as do the following: Dr. Curran¹⁴ relates that a young man was stabbed by a bayonet which, after penetrating the stomach and diaphragm, entered the pericardium and wall of the left ventricle. This man lived 53 hours, although in the mean time 96 oz. of blood was taken from him at intervals. Dr. Lebeuf¹⁵ was called to view the remains of a negro, who had been shot in the back at the distance of 8 ft. The ball entered between the ninth and tenth ribs, to the left of the vertebral column, and passed through the centre of the left ventricle. The interesting fact is that before dying, he ran 84 feet, turning two corners in his course.

ABDOMINAL WOUNDS.

1. Under the head of "Laparotomy for Gunshot Wounds of the Abdomen," an editorial in the *Philadelphia Medical Times* is as follows:—

"One of the most remarkable revolutions of modern surgery has been that which has occurred in the treatment of penetrating gunshot wounds of the abdomen. Until very recently a surgeon would have been considered foolhardy had he opened the abdomen for the purpose of searching for and repairing intestinal lesions. Now, one who fails to perform laparotomy when there is a

probability that the viscera have been injured or blood-vessels torn by a shot or other penetrating wound, is considered reprehensible; and without doubt, in the near future, the surgeon who fails to offer his patient the chances afforded by an operation, will be held criminally responsible in the event of an unfavorable issue of the case. The statistics of the late Civil War, as compiled by Otis, which demonstrated how almost uniformly fatal these injuries were, when treated expectantly; the vigorous writings of Marion Sims, and the experimental work upon animals, performed first by the elder Gross, and more recently by Parkes, of Chicago, have been potent factors in effecting this radical change in the treatment of these injuries. It only required the successful cases of Kocher and Bull to prove convincingly that what was true as regards animals, also held good in the case of human beings.

"At the opening session of the Surgical Section of the Ninth International Medical Congress, Dr. Charles T. Parkes, of Chicago, introduced this subject in an instructive paper. Up to the present time somewhat more than 40 operations for gunshot wounds have been performed, with a success of about 30 per cent., which rate will undoubtedly increase as operators become more skilled and acquire more confidence in the procedure. In our issue of November the 12th, Dr. J. M. Fox, of Philadelphia, reports another recovery after abdominal section, and suturing of the intestinal lesions, which is believed to be the first successful operation of this nature which has been performed in this city.

"At the Congress in Washington there was a considerable diversity of opinion in regard to certain points, but it was generally conceded that laparotomy was proper when there was a well-founded suspicion that the bullet had penetrated the peritoneal cavity. It can scarcely be doubted, however, that the number of successful cases treated expectantly has been under-estimated, but we cannot recommend this method of treatment except under exceptional circumstances.

"There are some questions connected with this subject which have not received sufficient elucidation. Is it necessary to perform laparotomy in every case of penetrating abdominal wound? It is our opinion that all wounds of the abdominal parietes should be explored with a disinfected finger or probe, and if penetration has been effected, the wound should be enlarged, in order to de-

termine whether lesions of any kind have been made. In stab-wounds the lesion must be limited to the region of the wound; hence it is not necessary to perform median section, and make an extensive examination of the bowels; but in gunshot wounds, unless the bullet is of very small size, median section had best be performed.

“Should laparotomy be performed for posterior and side wounds? The same rule applies as for wounds of the anterior abdominal wall; the wound should be explored with finger, probe, or by incision, and if it leads into the peritoneal cavity, section in the linea alba should be made. Fortunately, wounds in the back and side, even when they do penetrate the solid or hollow viscera, are very much less fatal than those which enter from the front, owing doubtless to the better drainage, and to the fact that the peritoneum is absent from the posterior surface of some of the viscera.

“We think that while there may be some difference of opinion in regard to the propriety of an operation in individual cases, there can be no dispute upon the propriety of operating in general when there is a probability of perforation of the intestines, or any of the other abdominal viscera.

“The fact appears to be well established that all penetrating wounds of the abdomen are less fatal when treated by operation than when left to the process of nature.”

Notwithstanding laparotomy has been generally recommended during the past few years for penetrating wounds of the abdomen involving the organs contained therein, there are surgeons of eminence who prefer the expectant conservative plan in the treatment of wounds inflicted in civil life.

Dr. T. G. Richardson,¹⁶ of New Orleans, at the meeting of the American Surgical Association in May last, gave statistics from the Charity Hospital in that city bearing upon this subject. During the past five years there were treated upon this plan: 31 penetrating knife-wounds, with 24 recoveries and 7 deaths: 32 cases of gunshot wound of the abdomen, with 13 recoveries and 9 deaths. He was under the impression that the expectant plan was generally greatly to be preferred.

At a meeting of the New York Surgical Society, Drs. H. Lange, R. J. Hall and L. A. Stimson¹⁷ cited cases of recovery from penetrating pistol shot wounds of the abdomen involving its con-

tents, and judging from their remarks they regard the question still open as to the best plan to be pursued in their treatment, evidently leaning to the side of conservatism. The opinion prevailed at the meeting of the American Surgical Association, previously referred to, that laparotomy under the above circumstances would be generally required.

The statistics offered by Thos. S. K. Morton,¹⁸ of Philadelphia, in his report of 57 cases of stab, gunshot and other injuries involving the abdominal contents, which were operated upon, show an average mortality of 63 per cent., a great improvement over the statistics furnished during our civil war, when injuries under the treatment then in vogue show the mortality to have been $87\frac{2}{10}$ per cent.

Sir William MacCormac,¹⁹ in the annual oration before the Medical Society of London, May 2, 1887, has furnished additional statistics upon this subject, with a slight improvement of rate of recoveries over those given to the world by Dr. Morton. He includes all of Dr. Morton's cited cases in his report and strongly recommends operative interference.

The following views advanced by Dr. Chas. Nancrede²⁰ in his paper on laparotomy of gunshot wounds of the abdomen, read before the American Surgical Association, May, 1887, are especially important: "If these facts and the deductions from them be true, all ball wounds of the abdomen involving the stomach, intestines, bile or urinary bladder should be treated by suture, or by resection and suture; injured omentum should always be excised, and the serous surfaces carefully sutured. Wounds of the liver and pancreas are to be treated in the manner to be described. A wounded spleen or kidney is to be removed, provided certain contra-indications do not exist. Even penetrating wounds of the abdomen without involvement of the viscera, are better treated by exploratory section than by the expectant method. In many instances unsuspected injuries of the blood-vessels and viscera will be found and appropriately treated. Laparotomy, if done at all, should be done at the earliest possible moment that the condition will admit of it. Shock is the only thing that should delay the operation, and this should not do so if the condition is produced by hæmorrhage. In operating, strict antiseptic precautions should be carried out. The incision should always be

median, extending from a short distance above the umbilicus to two inches above the pubes. Unless there be free hæmorrhage, the small intestines should be carefully gone over, keeping them constantly enveloped in towels wrung out of hot water. Afterward the stomach spleen, kidneys, bladder, etc., must be carefully examined. The source of a severe hæmorrhage must at once be sought after. Wounds of the bowels should be secured with a Lembert suture, and dusted with a little iodoform. Wounds of the liver, if occupying its free border, should be coaptated, if possible with dry aseptic catgut, which will soon swell and fill the track made by the needle. If this cannot be done, the hæmorrhage possibly may be arrested by the thermo-cautery or, if the bleeding is free, the wound should be plugged with an iodoform gauze tampon.

“If, at the close of the operation, the bleeding is almost completely checked, the cantery may be used as a further protection, and the tampon removed. If, however, the bleeding is still free, the tampon should be replaced and allowed to remain permanently. Wounds of the pancreas, spleen and kidneys are to be treated in a similar manner. If these measures fail, the spleen or kidney is to be removed. Wounds of the bladder had better be united with dry catgut. Contused portions of the bowel should be excised; wounded or contused omentum or mesentery should also be removed. In removing a portion of the bowel, the cuts should correspond to the distribution of a large mesenteric branch. Should the pulse fail during the operation, flushing the abdominal cavity with hot water is often of service. The peritoneal toilet is most quickly and effectively made by irrigation with warm sterilized water, and subsequent removal with sponges. Wounds of the peritoneum should be united. In closing the abdominal cavity, the peritoneum should be sutured with fine silk or catgut. The muscular, aponeurotic, and cutaneous structures should then be united with strong silk. The wound should be dusted with iodoform, and the dressing completed by the application of a pad of absorbent cotton and a flannel bandage. Alimentation should be carried on by the rectum for 48 hours when possible. Where peritonitis comes on after the operation, the treatment will depend upon whether it has developed rapidly or gradually. In the former case there is often evidence of shock from vasomotor paresis, and

in these cases small doses of morphia with atropia will be of service, while large doses of opium may prove fatal. This should be continued until pain is relieved and the patient falls into a quiet sleep, from which he is readily aroused. In the later stages of peritonitis, one or more hypodermics of atropia will at times save otherwise hopeless cases. For the control of the vascular processes involved in peritonitis, we have two powerful measures, in the ice coil to the abdomen and in the use of leeches, if applied early, and the patient has not lost much blood. If the temperature continues to rise despite of treatment, it is probable that ptomaines are being absorbed, producing sepræmia. In such cases irrigation with safe antiseptic fluids is indicated. Where to make the incision is an interesting point that has not been absolutely determined. In looking over the authorities upon this question the preponderance of opinion is evidently in favor of the mesial line. Kocher, Bull, Dennis, Parkes, Gunn, Agnew, Sir William MacCormac, and many others advocate the median incision where laparotomy proper is required. Of course there are modifying conditions in stab and lacerated wounds where it is evident from the protrusion of abdominal contents, or from the juxtaposition of wounded parts, that none other could have been injured: then a simple enlargement of the wound will meet all essential requirements. This state of affairs is however rare, and where obscurity exists or a doubt arises, it will be decidedly safer to open the belly in the middle line."

A mistaken apprehension as to the necessary results that follow gunshot, punctured or lacerated wounds of the liver is prevalent and it is generally believed that death from hæmorrhage is inevitable.

This is not always the case, as is shown by the reports of Drs. F. W. Jackson and W. H. Potter²¹ at a meeting of the New York Pathological Society. The former described a case of pistol shot wound of the abdomen, the ball passing through the left lobe of the liver and through the diaphragm. The conservative plan of treatment was adopted; the patient lived for 32 days and died from an affection of the brain. Autopsy showed that the liver lesion had healed, the cicatricial tissue being clearly defined. No fluid was found in the abdominal cavity. Dr. Potter reported three cases:—

1. A case where the ball had passed entirely through right lobe of liver. At post-mortem the course of the ball could be plainly traced; there was an absence of fluid in the abdominal cavity. 2. Case, at autopsy, liver found perforated by pistol ball; absence of blood in cavity. 3. Case of rupture of liver without hæmorrhage. Abdomen free from fluid of any kind.

Dr. Ledyard,²² before the Clinical Society of London, reported a case of pistol shot wound perforating the liver. The patient was a policeman who was shot while in the line of duty: he was treated upon the expectant plan. Bile passed freely out at the external opening. The patient in time made a good recovery. The mortality of shot, stab and ruptured wounds of the liver are necessarily great under the most favorable circumstances. Eldie's²³ estimate for incomplete rupture is 78 per cent.; shot wound 39 per cent.; cuts and stabs 37.5 per cent. Myer regards this estimate as too low. Buckhardt²⁴ asserts that the mortality attendant upon wounds of the liver as above can be considerably diminished by the observance of strict antiseptic principles in their treatment. He opposes the method of treating liver wounds by deep or superficial stitches, and prefers packing the wound with strips of iodoform gauze, the ends of the strips to be left sufficiently long to hang out of the external wound. In this way he arrests hæmorrhage and gives vent to the escape of biliary secretion where the bile ducts are involved. He reports a case of recovery of stab wound of the liver, its left lobe having a cut of 3 ctm. long and from 5 to 6 ctm. deep; the hæmorrhage from the liver was and had been remarkably free.

One of the greatest obstacles to operative interference in penetrating abdominal wounds involving the viscera is marked and persistent shock. The earlier the operation after the infliction of the wound, the greater are the chances of recovery in order to produce speedy reaction.

Dr. Thos. J. Moore,²⁵ after recommending the application of heat and the subcutaneous injection of atropia and morphia in combination, states that for several years past it has been well known to the profession that quinia administered anticipatively will prevent shock in capital operations. "It will, in almost an equally efficacious manner, bring about reaction after the establishment of shock following an injury. I am surprised to see so

valuable and important a factor relatively ignored; in our leading text-books it is merely mentioned and that is all. For its proper administration it should be prepared in as non-irritating a manner as is compatible with holding it in solution.

"There are several preparations recommended, all of them valuable, but none equal to the hydrobromate of quinia prepared as recommended by Professor Gubler. The following is his formula:—

R Quinia Hydrobromate.	. . . . .	gr. xlviii.
Aquæ Distillat.	. . . . .	ʒiv.
M. and dissolve, if necessary by heat.		
Sig.: Twenty minims contain four grains.		

"Three injections of twenty minims each will usually be required for the first administration, to be followed in the next twenty or thirty minutes by a corresponding amount.

"It should invariably be used as an indispensable factor in establishing reaction from shock. I believe if it was generally resorted to, it would be the means of saving many patients who would otherwise succumb."

Dr. J. Collis Warren,²⁶ in paper read before the American Surgical Association at its meeting in May, 1887, after citing a number of experiments made upon dogs with pistol shot and stab wounds, involving the hollow viscera, urges the necessity of penetrating the submucous tissue by the sutures in the repair of wounds of the intestines, declaring it to be superior in toughness and resistance to either the serous or muscular coats of the bowels. He further urges the importance of replacing the organs that have been disturbed or removed from the cavity during a laparotomy in their natural anatomical relations the one to the other, as adhesive inflammation with adjacent agglutination of parts, of a temporary character, almost invariably takes place; by the observance of this rule, the danger of bowel obstruction will be avoided.

The following are the reported cases of penetrating abdominal wounds operated upon during the year 1887 with results attendant thereon:—

1. J. J. Shalley.²⁷ Case of laparotomy for penetrating pistol shot wound. Upon opening the belly, organs and vessels found uninjured, incision closed, patient recovered. 2. Thos. G. Morton,²⁸ penetrating pistol shot wound of abdomen. Median section; jejunum found to be perforated in two places; colon nearly torn

across; injured intestine repaired with sutures; recovery. 3. M. Pozzi,²⁹ pistol wound of abdomen; median laparotomy; jejunum and bladder found to be perforated; parts brought together with sutures; death. 4. W. W. Keen,¹² penetrating pistol shot wound of abdomen. Median laparotomy; wound of liver, stomach, intestine, kidney, mesenteric vein; nephrectomy; patient died on 15th day. 5. E. E. Case,³⁰ Tacoma, W.T., penetrating pistol shot wound of abdomen; laparotomy; large collection of blood in the abdomen; cavity thoroughly cleansed antiseptically; incision closed; recovery. 6. A. S. Priddy,³¹ Keysville, Va., penetrating pistol shot wound, operated on the fifth day after receipt of injury; laparotomy by median incision; negro, surroundings bad in the extreme; serum and pus found in the abdomen with faecal odor; descending colon lacerated for more than 6 inches, laceration extending into sigmoid flexure; meso-colon perforated; united gut with continuous suture, left the mesentery wound to take care of itself; recovery. 7. Jos. M. Fox,³² Philadelphia; penetrating pistol shot wound of abdomen; laparotomy, median incision; perforation of transverse colon, jejunum twice perforated; mesentery perforated; faecal extravasation; an omental vessel found bleeding, large quantity of blood in the abdominal cavity; vessel tied, wound sutured; recovery. 8. F. Lange,³³ penetrating pistol shot wound of abdomen; median laparotomy 24 hours after receipt of injury. There were seven perforations of gut; one had already healed spontaneously, the remaining six repaired by suturing; recovery. 9. Dr. Abbe,³⁴ penetrating pistol shot wound of abdomen; median laparotomy six hours after injury; intestine perforated in four places; wall of bladder pierced; injured parts united by sutures, abdomen closed; 15 hours after operation patient died. 10. Mr. Barker,³⁵ pistol shot penetrating abdomen; median laparotomy; abdominal organs intact, slight hæmorrhage in cavity; bullet found and removed; recovery. 11. Isaac Warren,³⁶ Somerset, Ky., penetrating pistol shot wound of belly; laparotomy, median incision 24 hours after injury. Peritonitis; small intestines perforated in five places; mesentery in two; wounds repaired in usual way; death 14 hours after operation. 12. Jos. M. Fox,¹² Philadelphia, penetrating pistol shot wound of abdomen; laparotomy, median section; wound of the omentum, four wounds of the intestine, one of mesentery; all closed with sutures; recovery.

STAB WOUNDS OF ABDOMEN.

1. Dr. Formad,³⁷ penetrating stab wound of the abdomen, involving intestine; laparotomy, median incision, gut repaired; death 60 hours after operation. Autopsy: abdomen healthy; no fluid in cavity; intestinal wound intact. 2. Dr. Jenkins,³⁸ Henderson, Ky. Stab wound of the abdomen, implicating colic artery; laparotomy by enlarging the wound; bleeding vessels secured, abdomen cleansed; recovery. 3. Jos. M. Fox,¹² Philadelphia. Stab wound of the chest and abdomen, with omental protrusion; the wound enlarged; two and a half inches of protruding omentum cut off, tied and returned within cavity, incision and original wound closed; death on 34th day from empyema. 4. Thos. G. Morton.³⁹ Stab wound of the belly; laparotomy, median section; ileum linear cut of two inches; an artery also wounded; ileum repaired, artery tied; recovered. 5. J. A. Black,⁴⁰ Round Rock, Texas. Penetrating stab wound of the abdomen, omentum pierced, stomach penetrated in its great curvature by linear cut of one and a half inches; external wound enlarged for five inches, stomach wound closed, omental wound left alone, parts antiseptically cleansed, external incision and cut closed, with exception of place left for drainage; recovery. 6. Jos. M. Fox,⁴¹ Philadelphia. Penetrating stab wound of belly, median laparotomy, clotted blood and serum found in the meshes of the omental tissue; omentum cut for two inches and omental artery divided, artery ligated, omental cut repaired; patient recovered. 7. By the same, penetrating stab wound of the belly; median laparotomy, liver penetrated one and a half inches cut three-fourths of an inch long; applied Paquelin's cautery; death. Autopsy; there had been no hæmorrhage from liver; it appeared healthy; one-half ounce of bloody serum found in the cavity. 8. F. H. Wegmore.⁴² Incised penetrating wound of the abdomen, puncture of small intestine, puncture of sigmoid flexure, mesentery punctured in five places, hæmorrhage copious; injured contents repaired and returned; external wound closed; death. 9. J. W. Grunge.⁴⁵ Patient gored by bull in right iliac region; wound four inches long, rectangular in shape; no injury to abdominal contents; large protrusion of intestine and omentum; wound enlarged to return abdominal contents; incision and external wound closed; recovery.

From the above it will be seen that of the 12 penetrating pistol shot wounds reported, 8 recovered and 4 died; of the 9 penetrating stab wounds, 5 recovered and 4 died.

Gunshot Wounds of Extremities.—Mr. Robt. Borde⁴⁴ reports a case of gunshot wound of the shoulder joint, where a load of buckshot, eleven in number, entered between the folds of the axilla, passed through the joint and came out a little to the outer side of the acromion. Dr. Miles made an incision three inches long on outer side of the joint, and removed the head and about one inch of the shaft of the humerus. Patient did well for 9 days, when hæmorrhage occurred. Dr. Miles endeavored to find bleeding vessel by enlarging original wound in axilla; failing to do this, he made an incision along the lower border of the clavicle, down the line of cut made for excision, which had healed by first intention. Through this opening he removed pieces of bone and gun-wadding. It was not until he cut the attachment of the pectoralis minor, that the axillary artery was found and tied. The bleeding vessel could not be found. The man eventually recovered.

Mr. Croft⁴⁵ operated upon a boy who had a punctured wound of the calf of the leg, wounding the posterior tibial artery and severing the accompanying nerve; an attempt to control the hæmorrhage, which was great, by compression, failed. An incision was then made, the artery tied at both ends with catgut, and the severed ends of the nerve, which had retracted an inch and a half, were carefully sutured with the finest silk. The boy recovered with perfect use and sensation of the leg.

Dr. A. H. Howe⁴⁶ reports four cases of penetrating wounds of the knee-joint at the Boston City Hospital. In all of the cases the wounds were substantially clean incised wounds, and the joints opened. Two of the cases were treated at once antiseptically, and left the hospital, one in 33 and the other in 35 days. A third case, where antiseptic precautions were not employed until three days had passed, recovered after suppuration, in 102 days; and the 4th case, where no antiseptic was used until the 8th day, died on the 18th day. Great care was employed in all the cases to keep the joint immobile.

Dr. Moullin⁴⁷ reports a case where a charge of shot from one barrel of a shotgun passed through the foot; the aperture of entry was over the bases of the metatarsal bones of the 1st and 2d toes.

The wound of exit embraced all that portion of the sole of the foot which does not touch the ground in standing. No effort was made to remove the débris of bone, shot, wad, and pieces of boot. The foot was immersed in a bath of antiseptic solution and continued without intermission for 9 days; carbolic acid was first used 1-100, and afterward corrosive sublimate or boracic acid; after this the foot was wrapped in lead and spirit lotion, and immersed for an hour each day in a corrosive sublimate bath. He recovered without fever or inflammation and after six months could walk four or five miles.

The present ideas in regard to the treatment of gunshot wounds of joints by primary or secondary resection, is discussed in an elaborate article by Schuchardt.⁴⁸ After presenting a detailed comparison of the recorded statistics, Schuchardt gives the following conclusions:—

1. Joint-resections for gunshot injuries performed before the introduction of antiseptic surgery, yielded very unsatisfactory results, both in rate of mortality and functional results.

2. That formerly primary resection gave superior results, both in regard to recovery, and to the function of limb.

3. That the bad results caused the adoption of an expectant or strictly conservative plan of treatment, by the most experienced army surgeons.

4. Since the introduction of the antiseptic treatment of open wounds, the indications for resection have become reduced and the results from expectant treatment considerably improved.

5. That even when operative interference is indicated, total resection is only required where both articular surfaces are extensively involved. In most cases, simple arthrotomy, with any osseous fragments, a thorough irrigation and drainage followed the removal of the bullet.

6. Free exposure of the interior of the wound is indicated only in dirty wounds or extensive injuries of soft parts. With a small wound and favorable external conditions, the presence of the bullet or other foreign body, a free primary incision into the articular cavity is not indicated, for, by simple aseptic occlusion, most cases recover without serious impairment of function.

7. Secondary resection is indicated where expectant treatment has failed and an abnormal appearance of the wound, or interrup-

tion of the healing process, are indications for prompt operative interference.

8. The duration of treatment in aseptic cases is slightly shorter after primary than after secondary resection, but not enough to justify its preference to the conservative or expectant plan on the field of battle.

9. Although, theoretically, the dangers of a fatal result are less after a primary than a secondary operation, this comparison is not fair, since the secondary operation is performed only after the expectant treatment has failed and for each secondary resection, many others recover after antiseptic occlusion.

10. Functional results depend on the amount of bone removed, and the kind of after treatment.

11. In the knee or ankle, ankylosis or an amputation-stump is preferable to a movable joint.

12. Transportation is more unfavorable to a patient after resection than after the expectant plan. For this reason, and also since on account of the large number of wounded requiring attention after a battle, an aseptic subperiosteal resection is attended with great difficulty. Such operations are to be avoided, if possible, on the field.

"What is the proper treatment of penetrating wounds of joints?" is the title of a paper presented by Dr. Byrant⁴⁹ at the International Congress in Washington. He thought arrest of hæmorrhage, antiseptic precautions, and pressure, were the first considerations. Wounded joints should be immobilized and extended. In the discussion following this paper, Dr. Lamoine thought that the simplest wounds of knee-joints should be amputated. Dr. Bontecou thought excision or amputation should be practiced. Dr. Martin believed that amputation should not be delayed, when disorganization exists. Dr. Buvinger related cases that had been saved without amputation. Dr. Stern said when joints of the fingers are punctured by a human tooth, amputation is demanded: curetting, caustics, and antiseptics, are of no avail. Dr. Watson would rely on perfect asepsis and not amputation for penetrating knee-joint wounds. Dr. Farkas related his experience in the Bulgarian War: of 19 consecutive cases of penetrating wounds of knee-joint, there was no death. The cases were treated in the expectant plan and antiseptically. Dr. Gregory was aston-

ished that amputation was suggested. Dr. Wood thought that when loss of time was great, or great trunks were divided or tetanus set in, amputation should be done.

MISCELLANEOUS WOUNDS.

Col. Paul Methnen⁵⁰ states that in the Franco-Prussian War only six Germans owed their death to the sword, and that the total number wounded by this weapon, with which the Romans conquered the world, was only 212.

At a meeting of the Paris Medical Society, M. Jeannel⁵¹ reported a case of a man severely bitten in the shoulder by a lion; the limb had been amputated by the lion at the elbow, and the humerus laid bare. The accident occurred at 9 P.M. The following day emphysema and gangrene appeared. Amputation at the shoulder was performed, but the man died in a few hours from profound septiciæmia. M. Polaillon reported another case of lacero-contused wound, with comminuted fracture of the forearm from a lion's bite. Amputation was done at once at the shoulder joint, but the man died with acute sepsis. Infection in both cases was from contusion of parts, and contagion from partly decomposed meat which the lion was eating. In all such cases amputation should at once be made.

Dr. Oxford⁵² says that wounds made by knives used in large meat-packing houses heal badly. The septic material conveyed by the knife resists all antiseptics but the actual cautery, which is recommended.

M. Chauvel⁵³ at a recent meeting of the Surgical Society of Paris, gave the results of his experiments upon the effects produced by the steel-coated projectiles of the newly introduced gun; these bullets are cylindric, made of lead inside and coated with steel; they weigh sixteen grains. Visceral wounds made by them are mortal. Flesh wounds are insignificant. Osseous lesions in spongy portions of the bone are like sharply defined incisions. In the diaphyses with compact structure, the ravages are frightful.

Mr. Bellamy⁵⁴ reports the case of a large pistol ball fired through the mouth, lacerating the soft palate and lodging in the basilar process. Four years after the bullet, remained embedded in the bone, probably encapsulated and giving no trouble.

POISONOUS BITES.

Dr. Hawack⁵⁵ recommends for snake bites, permanganate of potassium. It is applied to the wound (one part of the salt to six of water), and injected above the seat of injury. Ammonia is administered internally. Dr. Ekaus Arboc⁵⁶ recommends the same remedy, and says that suction is of no value. Nearly every section of country has some "snake-bite plant or weed," generally found to be worthless when examined. In this country persons if let alone usually recover from bites of snakes; the writer has seen two deaths from overdoses of whisky administered as antidote.

Drs. Weir Mitchell⁵⁷ and Reichert have submitted to a careful physiological analysis their different products of snake-poison. The venoms resemble closely the salivary secretion of the vertebrates; their active principle is contained in the fluid part of the venom only, and can be maintained in a dried state, or kept in alcohol or glycerine. The active principle is divisible into two classes of proteids, globulin and peptones. The chief local antidotes are permanganate of potash, ferric chloride, and tincture of iodine. Death, after snake-bite, may occur through paralysis of the respiratory centres or cardiac paralysis, or hæmorrhage in the medulla, or from widespread destruction of the red corpuscles.

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SURGICAL TUBERCULOSIS, ABSCESS, CARBUNCLE ETC.

BY JOHN GUITÉRAS, M.D., PH.D.

CHARLESTON.

LOCAL OR SURGICAL TUBERCULOSIS.

It is difficult to classify the voluminous literature of this department of medicine. The report of our Corresponding Editor, Dr. Championnière, calls attention to the number of contributions on the tuberculosis of bones and joints. He mentions the work of Lannelongue establishing the tuberculous nature of the lesions of coxalgia; the study of tendinous and synovial fungosities by Nicaise and Terrier; and the valuable contributions of Poulet, who has studied the distinctive features of the syphilitic and the tubercular affections of bone.

The report of our Corresponding Editor, Dr. Helferich, of Griefswald, mentions the experiments of W. Müller,¹ who produced tubercular disease of the tibia by injecting tuberculous pus in the nutritive artery of the bone. Garré discusses the occasional absence of the bacillus in the pus from cold abscesses, whilst the same may be found virulent. He concludes that there must be spores of small size that resist the staining. The local tubercular affections are frequently multiple, either because of the deposit of the virus from without in different places, or because of its introduction at different times. There is no reason to believe that younger tubercular foci originate by auto-infection from the older. Were this true we would have more frequently the infection of wounds in tuberculous children. The frequency with which slight trauma seems to be the starting point of local tuberculosis, and its rarity after severe injuries, indicates, in the opinion of the author, that the active reparative changes in the latter case must interfere with the development of the bacillus.²

A case reported by Leser³ shows the development of local tuberculosis by auto-infection. The same author reports a case of lupus following an eczema. The eczema developed under a dress-

ing constantly saturated with the discharges from a tuberculous hip joint. The tubercular ulcers in the first of these cases are described as follows: The last phalanx of the thumb and of the index finger are swollen, and the portion of the skin not involved is dead. In some places the skin has broken down, and in others it is so attenuated that the probe can be seen through it. The granulations are painful, bleed easily, and are covered with pus. In some places they form subcutaneous swellings, soft and pseudo-fluctuating. The features of tubercular affection of the skin of the hand are shown in the annexed colored plate.

Another case of tubercular skin affection is reported by Condamin.⁴ The tuberculous nature of *onychchia maligna* is shown by a case reported by Edward Von Meyer.⁵ A secondary involvement of the lymphatic glands was unquestionably tuberculous. Baginsky⁶ reports a case of general tuberculosis, with a tubercular eruption on the velum, the tonsils, and the gums. In *genital tuberculosis*, according to M. Trélat,⁷ the place of selection is the epididymis, then follow the spermatic cord, the prostate, the seminal vesicles, and finally the testicle.

The rice-like bodies found in fungous joints are described by J. L. Reverdin and Albert Mayor⁸ as tubercular granulations consisting of more or less connective tissue, permeable and obliterated vessels, and miliary tubercles.

A very interesting case of perforating tuberculosis of the cranium is presented by Michel Gandolphe:⁹ a girl four and a half years old, with multiple tubercular lesions, and a large tubercular nodule in the left parietal. There was no projection from the inner table, and the very slight adhesions of the dura showed that the tubercular meningitis present had not developed by contiguity. The pericranium was thickened and infiltrated with tubercular granulations. The scalp was not affected. The bone lesion consisted of a sequestrum surrounded by a caseous substance, and larger on the internal than the external aspect. The surrounding bone showed no appreciable alteration except a slight condensing osteitis. The lesion compared very instructively with syphilitic affections.

A very interesting résumé of the local tubercular affections is made by R. Volkmann.¹⁰ They are divided as follows: 1. Lupus, found generally in persons without a hereditary predisposition.

2. The tuberculous ulceration of the skin, formerly described as scrofulous, and most frequent in the young. 3. Primary tuberculous abscess of intermuscular, parossal, or pararticular connective tissue, mostly the result of bone lesion which is frequently overlooked. 4. Primary tuberculosis of the connective tissue, generally in the *panniculus adiposus* of young children. These are the *gommes tuberculeuses* appearing in the shape of numerous, flat, small nodules, which soon break down. 5. Tuberculous abscess which is characterized by a distinct lining membrane, and the absence of involvement of the surrounding tissues. 6. Tuberculosis of the tongue, presenting itself in the shape of ulcers, sometimes torpid, sometimes fungous, at other times forming deeper seated nodules which soften at the centre. The solitary tuberculous ulcer of the tongue, with fungous growth and indurated edges, may be easily mistaken for carcinoma. In two cases the tongue was found covered with superficial ulcers, the intervening tissue being dotted with miliary tubercles. 7. Tuberculosis of the palate and pharynx, almost exclusively found about the age of puberty. The lesion consists of flat, confluent ulcers, with yellow base, spreading from the palatine arch to the posterior wall of the pharynx, and the posterior surface of the velum. By means of a strong light it is generally possible to discover the miliary tubercles between the ulcer. The extensive contractions and adhesions of the velum and upper part of the pharynx are more frequently the result of tubercle than syphilis. In its severe forms the latter generally produces defects of the palate. 9. *Ozæna tuberculosa*. 10. Tuberculosis of the lips. 11. Fistula in ano. It has a tendency to form large masses of fungous granulations, widespread loosening of the mucous membrane, undermining of the outer skin, and sinus abscesses. 12. The peri-typhlitic abscess of insidious course. It originates in the perforation of a single tuberculous ulcer, and forms large fungous abscesses and fistulæ.

TUBERCULAR ABSCESS. COLD ABSCESS.

In the light of recent investigations it is impossible to separate the cold abscess from the tubercular affections. The field of the chronic non-tubercular abscess is becoming more and more limited. The cold abscesses that develop during and after some of the

infectious diseases require further investigation. They constitute, it appears, with some of the peri-visceral abscesses a group in which the evidences of tubercular infection are still wanting. The wall of the tubercular abscess is described by Volkmann as a characteristic violet grey, or yellowish grey, opaque membrane, several millimetres thick, sparingly supplied with vessels, and crowded with tubercle bacilli. This formation is easily scraped and loosened from its basement membrane. The latter shows no evidence of infection. The neighboring tissues are seldom invaded by tubercular eruptions and cheesy infiltrations. These features distinguish the tubercular from the syphilitic and actinomycotic abscesses.

Treatment.—The removal of the infected tissues, by active surgical intervention, the bloody method—*intervention sanglante*, as the French call it—has been practiced very generally of late, and often with brilliant results. The knife, the chisel, and the curette, under antiseptic precautions, have not been spared, even in enormous accumulations of pus. Not rarely the operations have been followed by primary union. Eight cases of extensive abscesses, from bone and glandular lesions, treated in the above manner, are reported by Ed. Delorme.¹¹ In one of these cases the sacro-iliac joint, in another one of the lumbar vertebræ, was involved. The extensive walls of the abscess were carefully scraped, one or more drainage tubes were introduced, and the wound closed, with antiseptic precautions, by deep seated and superficial sutures. Similar cases are reported by Bonilly,¹² Segond,¹³ Ribell,¹⁴ Ferron,¹⁵ and Pichon,¹⁶ who treats especially of peri-costal abscess. Volkmann¹⁷ reports that of 57 cases of cold abscess from spondylitis, 23 healed by first intention after the free incision. The early opening of psoas abscess by anterior and posterior incisions, with thorough drainage, was advocated by Lewis H. Sayre, and Edmund Owen at the last International Congress.¹⁸ Demars and Verneuil¹⁹ urge the importance of antiseptic precautions during these operations for the removal of tubercular foci, in order to prevent auto-infection.

The treatment of these abscesses by the injection of ethereal solutions of iodoform originated with Mosetig-Moorhof, and is generally practiced by Verneuil and others. The treatment consists in aspiration of the abscess with a large needle, and the

subsequent injection of 3--5 ounces of a 5--10 per cent. solution of iodoform in ether. In some cases one injection has been sufficient, in others it has been repeated several times. The most favorable results are obtained when the abscess opens spontaneously subsequent to the operation.

Reclus²⁰ reports a perfect success in three out of four cases of Pott's disease, and Prof. Bruns²¹ states that of 54 cases of cold abscess, forty have recovered under this treatment. Successful cases are also reported by Schwartz,²² Ribell,¹⁴ Trélat.²⁰

One of the first effects of these injections, according to Bruns, is to cause the disappearance, within a few weeks, of the tubercle bacillus from the walls of the abscess; and Chantemesse²³ has shown that the pus of a tubercular abscess loses its virulence after the iodoform-ether injections. These results are difficult to reconcile with the experiments of Roosing,²⁴ who shows the inertness of iodoform even when mixed thoroughly and in large proportions with tuberculous masses. Some unfavorable results from the employment of these injections have been reported. The evaporation of the ether sometimes produces considerable pain. To avoid this, Billroth²⁵ uses a 10 per cent. mixture of iodoform and glycerine. The abscess is tapped with a medium size trocar, the pus is evacuated, and from 40 to 50 grams of the mixture are injected. The injection is not repeated until the iodoform ceases to appear in the urine. Andrassy²⁶ injects every two weeks a mixture of 10 parts of iodoform, 50 of glycerine, and 50 of water. He reports a successful result in twenty cases out of twenty-two. The ether injections have been followed in some cases by sloughing of the skin, the serious consequences of which may be avoided by early incision (Mignon).²⁷

In a case of Bœckel's²⁸ the patient died during the operation. It was found that the abscess cavity communicated with the subclavian artery. In three cases of König²⁹ the puncture of the abscess was followed by profuse hæmorrhage, due to arterial erosion. The arteries involved were the gluteal, the deep femoral, and the external plantar. These had to be ligated. A similar complication occurred in two cases of H. Lindner,³⁰ one of fatal hæmorrhage from the femoral, and the other from the iliac vein. The injection of 200 grams of a 10 per cent. solution of iodoform

caused grave symptoms of poisoning. The injections were successfully treated in smaller quantities.

Terrillon³¹ recommends free incisions and the curette for superficial abscesses. He prefers to open the deeper abscesses by a small incision; he washes out the cavity with filtered or boiled water, and introduces a drainage tube which should not reach to the bottom of the cavity. The skin is carefully disinfected, and the opening covered with antiseptic dressing. Dr. Quinlan³² recommends the passage of one or two silver wires through the tumor. Hodgen,³³ of St. Louis, uses the aspirator early in the treatment of psoas abscess. The operation is repeated from four to seven times if necessary, and the plaster-jacket applied. J. A. Bloxam³⁴ treated successfully a case of double psoas abscess, by a small incision, drainage and antiseptic dressing. Bazy³⁵ treats ischio-rectal abscess by a similar method with prolonged irrigation of the cavity. A case of sub-diaphragmatic abscess, successfully treated by free incision, is reported by Lesing.³⁶

The treatment of surgical or local tuberculosis by the acid phosphate of lime has been recently brought forward by Kolischer³⁷ of Vienna. The solutions prepared for him by Freund are as follows:

First solution:—

Neutral phosphate of lime,	. . . . .	gr. lxxv.
Distilled water,	. . . . .	ʒj ʒivss.

Then add phosphoric acid enough to make a perfect solution.

Filter and add:—

Dilute phosphoric acid,	. . . . .	℥jx.
Distilled water enough to make	. . . . .	ʒij ʒj.

This solution is used for parenchymatous injections, and washing out the abscesses.

Second solution:—

Neutral phosphate of calcium,	. . . . .	ʒjss.
Distilled water,	. . . . .	Oj.

Add phosphoric acid to make a perfect solution. Filter and add:—

Dilute phosphoric acid,	. . . . .	ʒij or ʒiv.
Distilled water enough to make a	. . . . .	Oj.

This solution is used for impregnating the gauze.

The best results are obtained in children, and in joint troubles.

Some inflammatory action and fever sets in after the parenchymatous injections. These are used before the fungous masses have broken down. In cases that are well advanced, with cheesy changes, the injections are followed by the formation of abscesses. These discharge, and are followed by cicatrization, with less interference with the functions of the joint than is obtained by other methods. In more favorable cases the inflammatory products may be absorbed. The abscesses and open lesions of tuberculosis are treated with tampons made of the impregnated gauze. Careful antiseptic precautions and rest are enjoined in the earlier part of the treatment. In about three or six weeks calcification and shrinkage take place. Massage should be now recommended. The last publications of Kolischer show a considerable proportion of failures. He also points to gangrene as an occasional, though not serious consequence of this treatment. J. Rable³⁸ advocates the introduction of pieces of nitrate of silver into fungous abscesses. A piece weighing xxx-xlv grs. is inserted and allowed to remain in the parts. It causes the formation of a necrotic plug. The operation may be repeated in a few days. Cauterization of the skin is avoided by anointing with salt lard.

DISEASES OF THE LYMPHATIC APPARATUS.

The general pathology of the lymphatic glands in children is discussed in a paper by Prof. Read.³⁹ Simon⁴⁰ and Grancher⁴¹ contribute papers treating of the tracheo-bronchial adenopathies. These are classified as congestive, inflammatory, hypertrophic, scrofulous, tuberculous, and cancerous. The symptomatology of these affections is fully described by Grancher. This subject has not received the attention it deserves in America. A case of abscess of the bronchial glands, with pulmonary gangrene and perforation of the œsophagus, in a man 84 years old, is reported by Dr. Netter.⁴²

In examining the glandular lymphatic system it is well to bear in mind the observations of Penzoldt and Dietrich⁴³ concerning the palpable lymphatic glands found in healthy subjects. 92.2 per cent. of these had palpable glands in the inguinal, 82.6 in the cubital, 79.4 in the cervical, and 2.2 in the occipital regions. Children show a higher percentage than adults.

De Courtade⁴⁴ reports a case of acute lymphatic engorgement of the arm, following small-pox, in a goitrous subject.

Treatment.—The management of enlarged lymphatic glands is much influenced by the prevailing views as to the treatment of local tuberculosis. The injection of ethereal solutions of iodoform, into the gland parenchyma, and into abscess cavities is recommended by Peyrot and Jonesco,⁴⁵ by Verchère, by H. C. Rogers,⁴⁶ and others.⁴⁷

The treatment by ignipuncture is recommended by Genzmer⁴⁸ and Duménil. A more decided surgical interference is recommended by others. In the report of Dr. Bayer, Corresponding Editor, of Prague, we find described the treatment employed by Mosetig-Moorhof, who lays open the abscesses and fistulæ, empties the contents, rubs the walls with iodoform, and brings the surfaces together by systematic pressure.⁴⁹ In regard to the removal of enlarged glands, we have the authority of Alexander,⁵⁰ of Liverpool, against the operation when the glands are indolent and firm. The extirpation of hypertrophied glands is reported by C. F. Parkes,⁵¹ and L. B. Creath.⁵² The operation was performed by Christian Fenger⁵³ for malignant disease of the cervical glands, in two cases. One of these died of secondary hæmorrhage, the other showed no return within a year. The successful extirpation of a large lympho-sarcoma of the neck, with resection of portions of the common carotid and the internal jugular, is reported by Higinio Tantini.⁵⁴ J. M. Batten,⁵⁵ of Pittsburgh, favors the treatment by external applications of iodine, and general treatment. Simon⁴⁰ advises, for the prevention of bronchial adenopathy, hygienic measures during the convalescence from bronchitis and whooping cough. If the cough persists he uses belladonna and aconite. The digestive powers, above all else, must be kept in good condition. Grancher⁴⁵ advocates the use of gradually increasing doses of cod liver oil, until large quantities are taken.

ABSCESS.

The *subperitoneal abscess*, the *iliac and psoas abscess*, and the *pelvic abscess*, receive special attention on account of their frequency, or on account of interesting anatomical relations. A very elaborate description of the topographical anatomy of the parts involved, with applications to clinical surgery, is given by Dr. Rudolph Matas,⁵⁶ of New Orleans. This important contribution is divided into four parts, treating; (1) of the relations of the

intestine and peritoneum to the iliac fossa; 2d of the subperitoneal connective tissue; 3d of the distribution of the iliac fascia and its important surgical relations; 4th of the connective tissue under the iliac fascia, *i.e.*, the subfascial or subaponeurotic areolar tissue. The frequent development of iliac abscess in inflammation of the cæcum is explained by the early formation of adhesions between the gut or its appendage, and the peritoneum lining the iliac fossa.

It is recommended that these abscesses should be treated by free incision and drainage, with the exception, according to some authorities, of the subaponeurotic abscess. In case of doubt, exploratory punctures may be made, as directed by Matas, either above Poupart's ligament close to the anterior superior spine, or below the ligament close to the anterior inferior spine, or finally in the lumbar region in Petit's triangle.

Laparotomy is indicated, according to Dr. Matas, in disease of the cæcum or appendix when ulceration, perforation and extravasation have taken place; also in cases of peri-typhlitic abscess that open into the peritoneum. Subperitoneal abscesses, treated by free incision and drainage are reported by Delassus⁵⁷ and Grellet.⁵⁸ W. Walters⁵⁹ reports a case of peri-typhlitic abscess, and another of ovarian abscess terminating favorably by spontaneous rupture into the bowels. A stercoraceous abscess from pinching of a portion of the intestinal wall at the femoral ring is reported by Gondwin.⁶⁰ The abscess opened spontaneously, and was successfully treated by antiseptic dressings. Dr. Ozenne⁶¹ contributes the account of a case of diffuse gangrenous phlegmon of the abdominal walls, with glycosuria. The latter symptom appears to have been transient. The inflammation was characterized by the absence of pain.

Cervical abscesses are also invested with special interest on account of their anatomical relations. The special phlegmon of this region is described under the name of Ludwig's angina. A work treating of this subject has been published by Dr. Chabral.⁶² Cases of cervical cellulitis are reported by Andrew Lyall⁶³ and R. B. Newit.⁶⁴ The latter recommends that the incision should be made in the median line of the neck, from whence a groove director may be insinuated along the fascial layers toward the seat of suppuration. The incision may be made also behind the sternomastoid muscle.

The cold abscesses that develop after typhoid fever, are believed by Trélat⁶⁵ to be the result of the degenerative changes that occur in the muscles in that disease. He treats them by evacuation, and injections with iodoform and ether.

R. J. Morris⁶⁶ contributes an account of the treatment of diffuse phlegmonous inflammation of the extremities. If the tissues are tense, but still elastic, the limb is elevated, hot applications are made, and opium and saline cathartics are given. If the inflammation cannot be arrested at this stage, and the tissues become brawny and œdematous, several incisions are made down to the muscle. When the swelling has subsided, the incisions are washed with peroxide of hydrogen, the surfaces are covered with a thin layer of boracic acid or bismuth, and the hot fomentations are continued until the limbs become soft. Firm and even pressure is then applied with the antiseptic gauze. If suppuration has taken place, free incisions and antiseptic treatment are advisable. For the abortive treatment of phlegmon, L. Weiss⁶⁷ recommends multiple parallel incisions, dressed with a 10 to 30 per cent. resorcin-lanolin ointment. The pain is relieved within six or eight hours.

FURUNCLES.

Pathogenesis.—The mycotic nature of furunculosis has been demonstrated beyond question. The presence of the staphylococcus pyogenes aureus and albus, the transmission of the disease by contagion, and the successful inoculations of pure cultures, are reported by Bockhart,⁶⁸ Escherich,⁶⁹ Hergot,⁷⁰ Chambard,⁷¹ and Voituriez.⁷² The latter observer discusses the introduction of the staphylococcus into the system, through the alimentary and respiratory mucous membrane, beside the skin. He reports four cases of furuncles complicated with osteo-mycelitis. The case of Chambard seems to establish the existence of a furuncular pneumonia.

The treatment instituted in late years is based upon the above views. Dr. Bidder,⁷³ of Vienna recommends parenchymatous injections of 2 per cent. solution of carbolic acid. He makes from one to four punctures, according to the size of the boil. Escherich and Bockhart recommend incisions and disinfectant applications. The skin and the clothing should be also carefully disinfected. An ointment of 10 parts of red precipitate to 100 of lanolin is recommended by Jorissenne.⁷⁴ Gingeot⁷⁵ uses applications of

spirits of camphor or tincture of iodine. If the disease shows any tendency to recur he advises general baths of soda and alum, or of bichloride of mercury. The same author and Van Rentergehen⁷⁶ recommend the internal administration of the sulphide of calcium. Halle⁷⁷ prescribes tincture of arnica, 2 parts; tannic acid, 1 part; gum acacia, 1 part; to be painted frequently over the lesion. Palasne⁷⁸ considers the iodide of iron almost as a specific.

CARBUNCLE.

The same views expressed concerning furunculosis dominate the pathology and treatment of carbuncle; in fact it is impossible to draw a dividing line between the two affections. The following application is recommended by Wilkinson⁷⁹:—

Carbolic acid,	
Salicylic acid,	
Borax,	
Glycerine,	aa ʒj
Oil of Sassafras,	ʒij
Water,	q. s. to make Oj

Polaillon⁸⁰ recommends the introduction into the tumor of darts of chloride of zinc, and covers the parts with a disinfectant poultice. By this treatment 47 cases out of 48 recovered.

ANTHRAX.

Pathogenesis.—Straus⁸¹ has found a few bacilli in the placenta, and Branell has failed to find them.⁸⁵ A case is reported⁸² of a child born three days before the death of the mother from malignant pustule. Neither the histological nor the culture methods succeeded in establishing the presence of the bacillus in the child or the placenta. The failure of Razdzievski⁸³ to find the bacillus anthracis in the general circulation of three cases of malignant pustule, together with the general symptoms of the disease led him to the opinion that we have here to do with poisoning by some toxic material. Two deaths from anthrax have been reported in England;⁸⁴ one occasioned by the skinning of a bull, and the other by the handling of bales of English and Persian wool. Three cases of malignant pustule are reported from Midnapore by Surgeon A. Ternes.⁸⁵ Benley and Reynal⁸⁶ call attention to the frequency of splenic fever among flocks that pasture where there is much stagnant and brackish water.

Morbil Anatomy.—M. Straus⁸⁷ calls attention to the intestinal lesions found in some cases of anthrax. The stomach and intestines may be found studded with furunculous and ecchymotic spots, some of which show a gangrenous character. Of 63 cases of malignant pustule reported by Slessarewskji,⁸⁸ the disease showed itself 6 times on the face, 21 on the neck, and 34 in other places. Cases are also reported by H. O. Read,⁸⁹ F. J. Reilly⁹⁰ and R. Z. Pitts.⁹¹

Treatment.—The experiments of Watson Cheyne⁹² upon the antagonistic action of the erysipelas upon the anthrax virus are of extreme interest. He experimented on rabbits, first (a) by inoculating them with the cocci of erysipelas, and two to fourteen days later with anthrax; (b) by simultaneous intravenous or subcutaneous inoculation of both; (c) by inoculating the erysipelas virus, after the appearance of unmistakable symptoms of anthrax. Of the 15 animals treated under (a) 7 recovered, whilst all the control animals died. In group (c) 16 animals were experimented on by the subcutaneous method, and only 2 recovered. The results were very striking with the intravenous method. In 3 sets of experiments, by the injection of a half million of anthrax bacilli, all the control animals died, whilst all those that received intravenous injection of erysipelas virus, though they were very ill, recovered. Winoggradof and Kolesnikoff⁸⁸ have tested the germicidal power of the bichloride, carbolic, and salicylic acid upon the anthrax bacillus.

Dr. Bell⁹³ has treated unsuccessfully a case of anthrax, by the hot air bath. In the treatment of malignant pustule, Guyon⁹⁴ and Sereins⁹⁵ recommend injections of iodine solutions into and around the pustule. Uspenski⁹⁶ has obtained 10 recoveries in 11 cases by parenchymatous injections of 4–5 per cent. solutions of carbolic acid; and Induntjü⁹⁷ lost 1 case out of 6 by the same treatment. Steigert recommends painting with solution of the sesquichloride of iron. Dr. Slessarewskji⁸⁸ has obtained the best results by shaving off the surface of the lesion and dusting over with bichloride of mercury. He also gives quinine internally. F. Rivas⁹⁸ obtained prompt recoveries in three cases by the use of a paste of turpentine and quinine. Bryant⁹⁹ reports five cases treated by excision and antiseptic treatment.

Prophylaxis.—We have the authority of Straus⁸³ for the

statement that malignant pustule has diminished in France since the introduction of the charbon vaccine of Pasteur. Much has yet to be done, says Dr. Straus, in the line of policing the disposal of animals that have died from the disease, and of impeding the sale of hides and meats. More difficult of execution are the measures for the direct protection of artisans working on goods liable to infection, because the measures of disinfection are generally injurious to these articles.

R. Paul Ritchie¹⁰⁰ communicates some information concerning the supposed virtues of certain plants used by the Caffres, as a preventive against infection when handling or eating diseased meats. Pench¹⁰¹ reports to the French Academy of Sciences that thorough pickling with salt destroys the virulence of infected meats, but that any flaw in the process may allow it to persist. As a prophylactic measure against anthrax orders have been issued to the artillery in England, that the grass, when brought in, should be dried in the sun for four days, and then be staked, after cleaning.¹⁰² Every endeavor should be made to stake sufficient dry grass during the winter, for use during the rainy season.

At the International Congress of Hygiene, recently held at Vienna, it was maintained by Koch and others¹⁰³ that there was no proof that any advantage had been gained by the use of the charbon vaccine of Pasteur. Pasteur¹⁰¹ responds in a short letter containing a few statistical data.

GLANDERS.

MM. Cadeac and Malet¹⁰⁵ prove by elaborate experiments that the disease is not transmitted by inhalations. A case of chronic glanders is reported by Sakotski,¹⁰⁶ with extensive ulceration of the throat. The case was treated for syphilis for two years. One case is reported by Hadden;¹⁰⁷ two by J. D. Arnold;¹⁰⁸ one by H. Barbier.¹⁰⁹ C. N. Cooper¹¹⁰ reports a favorable termination of chronic glanders in a woman who had contracted the disease from her husband. The case of Dr. Albrecht, with detailed observations covering a long period of time, is reported by Dr. Kernig,¹¹¹ together with a report of Loeffler, who discovered in the patient the presence of the bacteria of glanders.

MALIGNANT OEDEMA.

In a fatal epidemic among the women engaged in the sorting

of rags for a paper factory in Riga, Kreimhals¹¹² established the presence of the bacillus of malignant œdema of Koch.

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DISEASES OF THE SKIN.

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SIMPLE INFLAMMATORY PROCESSES.

ERYTHEMA.—Polotebnoff¹ examines the confused subject of erythema in all its aspects, pointing out in an historical note the mistake made by Hebra in attempting to consider the disease under two heads, hyperæmic and exudative, it being practically impossible that the first condition should exist without the latter being present to a greater or less extent.

The question of the etiology of erythema is at present in a perfectly chaotic condition. Polotebnoff enumerates no less than thirteen distinct classes of causes. 1. Salt provisions, fish, fat, alcoholic excess, cold beverages, fatigue, exposure to cold and sudden changes of temperature are enumerated as causative especially among the older authors. 2. Weakly females especially at the menstrual period are said to be occasionally subject to erythema. Chlorosis is also mentioned as a cause. But chlorosis is an effect rather than a cause, though chlorosis and erythema may coexist. 3. Since Willan's time extreme changes of temperature and also change of season have been reckoned among the etiological factors in erythema. All authors agree that erythema is more frequent in the seasons of spring and autumn. Hardy and Kuhn, among recent authors, consider atmospheric and atmospheric-telluric influences as having some weight. 4. Menstruation has undoubtedly a marked influence upon the production of erythema, while other and varied perturbations of the female genital apparatus, as abnormal development of a tumor in the uterus, pregnancy, labor, etc., may act as etiological factors. 5. Willan first suggested cystolithiasis and irritation or inflammation of the bladder and urethra as causes of erythema, but later writers ignored these until comparatively recent times, when these etiological factors have been again brought forward, while at present disturbances of the genito-urinary

apparatus in both sexes, and especially blenorragia and vaginitis, are recognized causes. 6. Among chronic diseases which have been regarded as causative may be mentioned chronic nephritis, Bright's disease, and other affections of the kidneys. How these affections can cause erythema we do not know, but Polotebnoff thinks that irritation of the urinary nerve centres may account for it. 7. Icterus and cirrhosis of the liver are known to have occurred in connection with erythema. 8. Tuberculosis has been regarded by a number of writers as among the causes of erythema, and our evidence on this matter is quite strong. 9. Whether or no ordinary rheumatism can be regarded as a cause of erythema is still a vexed question. There is strong evidence in favor of this view, but on the other hand some of the so-called "rheumatic pains" attending outbreaks of erythema seem to lack characteristic symptoms of that disease. It may perhaps be safely asserted that acute articular rheumatism as an in all probability infectious process may be a cause of erythema. 10. Syphilis has been considered as a cause of erythema by Hebra and others. 11. A pyæmic erythema has been described by Neumann. 12. The vaso-motor nerves have been supposed by Erasmus Wilson and others to play an important part in the causation of erythema, and Schwimmer and others are inclined to make this affection depend in a great measure upon lesions or affections of the brain and spinal cord. Polotebnoff, however, considers this unproved. 13. A final etiological factor in the causation of erythema is local irritation, as that produced by rubbing tincture of iodine or ung. hydrarg. into the skin.

To sum up these various causes and group them under appropriate heads, we have four principal varieties of erythema. 1. Depending upon external irritation. 2. Reflex erythema: *a*, dependent upon external irritation of the skin; *b*, dependent upon internal irritation of some organ, *e.g.*, genito-urinary tract, liver, gastro-intestinal mucous membrane. 3. Central erythema resulting from irritation of the brain centres. 4. Infectious erythema, appearing in the course of infectious diseases.

By no means all cases of erythema met with in every-day practice can be classified under the divisions given, and this is particularly the case with the erythema multiforme of Hebra. The Vienna school considers these erythemata as of unknown etiology. Lewin divides them into simple and malignant, regarding the

greater number as independent infectious diseases. Auspitz calls them essential, idiopathic, dietetic angioneuroses of the skin. Besnier considers them as closely connected with the rheumatic diathesis.

Polotebnoff examines the clinical course of erythema in order to arrive at some independent conclusion as to its cause. Devergie, he says, has alone studied the prodromal period of erythema carefully, and this author asserts that the eruption may be preceded at one time by a group of symptoms peculiar to mild affections or at another by the symptoms of a severe affection. Fever is one of the least variable prodromal symptoms being usually present in the acuter forms of the disease. In some cases digestive disturbances, in others involvement of the respiratory mucous membrane, and in others still nervous symptoms, muscular and articular pains, etc., are observed. Lewin noted a peculiar tendency to lachrymation in his cases.

Many authors do not allude to a prodromal stadium at all. Probably most of these cases belong to the central and reflex erythemata which in fact have no prodromal stage. Polotebnoff asserts as the result of his experience that in all cases of erythema with the exception of the forms just noted, general disturbances of the system, though, indeed, at times but slightly marked, invariably precede the outbreak of the eruption. He is also inclined to believe that increase of temperature is also among the invariable prodromata.

It is a singular fact that the view prevalent in all handbooks of dermatology—that erythema nodosum is the only form of the affection which has a prodromal stadium—is not supported by Polotebnoff's observations. On the contrary this is always present. The severity and duration of these symptoms do not seem to bear any relation to the form or extent of the eruption.

As regards the duration and course of the eruption, observations made by various authors differ so widely that Conlaud is right in saying that no rule can be established.

The general symptoms do not cease with the eruption of the exanthem. A feeling of languor, headache, muscular and articular pains, lack of appetite, chills, sleeplessness, etc., continue after the eruption has appeared. Itching is at times a marked symptom and may be intense. It usually appears as the temperature falls, but

may coexist with high fever. Here too Polotebnoff is at variance with the received authorities; he says that itching is found in all varieties of erythema with the exception, perhaps, of *E. nodosum*.

Dermatologists have not given sufficient attention to the occurrence of fever in erythema, usually ignoring it entirely, and most observations on the subject have been made by other specialists. Here, as in many other cases, the misfortune of adhering too closely to the teachings of the Vienna school may be plainly observed. Polotebnoff goes into this subject with great care and fullness. One of his conclusions is that, on the ground of his own observation, neither the height of the fever nor its duration is in any proportion to the morphology of the eruption and the greater or less degree of its extension.

The apyretic forms of erythema which last months and years belong, according to Polotebnoff, to another etiological group than those under consideration. The view that erythema nodosum is always accompanied by higher temperature is without foundation. An entirely apyretic condition is sometimes observed in connection with the outbreak of *E. nodosum*. In this case the fever has probably been among the prodromal symptoms.

With the exception of eruptions upon the buccal, oral and pharyngeal mucous membranes which are not uncommon, intercurrent affections of the organs and cavities of the body have not often been reported in connection with erythema. However, at times, affections of the nervous system, the gastro-intestinal tract, the mucous membranes of the eye and genito-urinary tract, the pleura and lungs, the heart and pericardium, the spleen, liver, kidneys and lymphatic glands have been noted. Epistaxis and hyperhidrosis have also been observed as concomitant symptoms. Polotebnoff thinks this due to the fact that too much attention has been given by dermatologists to the mere skin symptoms.

His own conclusion from personal observation is that only those erythemata which run an acute, nearly typical course of ten to twenty days without relapse are usually accompanied by complications.

These usually have a marked prodromal stage and the general symptoms subside with the outbreak of the eruption. When the prodromal stage is not marked, and the eruption develops slowly and irregularly and is prolonged by numerous relapses with higher

or lower temperature, the intercurrent affections occurring in one part or another are more easily observed and may be varied. A singular fact seems to be that one type prevails one year and another in another year. Thus, gastric catarrh was in Polotebnoff's experience prevalent among his cases of erythema in 1875-6, while in 1883 affections of the mucous membranes of the air passages were common.

With regard to the epidemic occurrence of ordinary erythema, Polotebnoff does not speak positively. That form of erythema known as E. acrodynia, and which appears to be nearly related to dengue, Polotebnoff has himself observed and refers to the Parisian epidemic of 1828. He also gives pictures of the casts thrown off by the hands of one patient under his own charge.

In speaking of the anatomy and pathology of erythema Polotebnoff calls attention to the debility and anæmia which often result from an attack, even when there has been but little eruption. A fatal result is only rarely observed in erythema, and then as a result of some complication,—as typhoid, tubercular meningitis, hydrocephalus, etc.

One of the most interesting sections of Polotebnoff's work pertains to the question of the nature of erythema. He concludes that it is an infectious disease or rather a symptom of an infectious disease which may or may not present a marked eruption or any eruption. Some forms of erythema, however, are to be included among the central vaso-motor neuroses, and these are those chronic forms which run on sometimes for years either without intermission or with exacerbations and relapses. Like Auspitz, Polotebnoff is inclined to attribute these forms of erythema to a "constant or cyclical relapsing vaso-motor neurotic disturbance."

Certain rare forms of erythema are met with which are due to vegetable parasites (erythema trichophyticum).

It is only by such an etiological differentiation that the great variety of the course, the concurrent symptoms, complications, etc., can be understood.

After treating of the morphology of the eruption and the diagnosis of the erythemata, Polotebnoff concludes by a brief *résumé* of the therapeutics. Expectant treatment is the usual rule, or at most a symptomatic treatment, as alcoholic lotions or powdered starch when there is itching. This may do in the rapid and

self-terminating form of the disease, but will not be satisfactory in recurrent cases. In these, quinine is usually the best internal remedy. When enlargement of the liver or spleen is present Polotebnoff gives it in doses of six to nine grams a day in two or three doses until these organs return to a normal or nearly normal size. Polotebnoff is inclined to think that quinine hinders the recurrence of the disease and prefers the bromide of quinine (hydrobromate of quinia?). In highly nervous cases the bromides with quinine seem particularly useful. In vesicular and bullar erythema Unna's salicylic acid paste is useful, and where the eruption is extensive warm glue baths which improve the appetite and relieve the tension of the skin while hastening the healing up of the eruption. In a few cases where frequent relapses occur, no inward or outward means seem to do good and the patient's general condition becomes greatly deteriorated. Sometimes the patient's surroundings (unhealthy habitation or locality) seem to influence the continuance of the affection. In such cases change of locality sometimes acts very favorably. Where any central disturbance of the system (*e.g.*, Bright's disease) seems to affect the course of the disease or to act as a cause, a cure or relief of the central malady seems to do good to the erythema.

Treatment.—There is a congestive state of the skin which is frequent in the extremities of young lymphatic subjects,—a state which causes a bluish aspect and a sort of hypertrophy of the hands and feet as soon as the cold weather comes on and predisposes to frost-bite. Besnier uses in these cases foot and hand baths of a decoction of walnut leaves. Immediately after the baths frictions with camphorated oil are practiced and then the parts are powdered with a mixture of five parts of salicylate of bismuth and forty parts of powdered starch. Exposure to excessive cold should be avoided. In the evening, if there be much itching a wash of one part of tannic acid in fifty parts each of glycerine and rice water may be substituted for the powder. If ulcers form they are dressed with the walnut leaves used in the decoction.

ERYTHEMA INTERTRIGO IN YOUNG INFANTS.—Physicians should be prepared to diagnosticate this affection, which is common though only briefly described in the books. Erythema intertrigo may occur in the simple form of erythema, as papular erythema, or as

a rash in the course of exanthemata, in the form of superficial syphilitic disease, in connection with subcutaneous gummata, in connection with scabies, accidental eruption, etc. Of these the most important are, according to Sevestre,² simple erythema and papular erythema.

Simple erythema presents itself sometimes in the form of small isolated and disseminated patches upon the buttocks and neighboring parts, sometimes in the form of diffuse patches generalized over the entire region. In both cases the primary lesion is a small vesicle which dries up or is torn open, leaving behind a more or less vivid redness. The vesicles are usually closely grouped, and as they dry up form a continuous patch, of which the centre is dry while some traces of vesiculation may be observed at the periphery. Occasionally the vesicles are larger with thicker fluid contents, and the result is a weeping surface with crusts, or in rare cases some superficial erosions or ulcerations. When the cause can be removed this form of erythema is rapidly curable.

Simple erythema of newborn infants has a peculiar seat. It is usually most marked on the convex surface of the buttocks, but is not confined to this locality. It may extend over the perineum, the scrotum or the vulva, the inguinal regions, and even to the umbilicus, though it usually extends rather down upon the thighs. In boys an elongated ulcer is sometimes observed down the raphe of the perineum.

Some authors have considered erythema neonatorum as a grave symptom, and especially likely to be associated with thrush, but this is by no means necessarily the case. Most cases are only due to intertrigo, and are speedily cured by extreme cleanliness and the application of some fat or the interposition of pieces of fine linen between the opposing parts. Others and especially where vesicles are present (the "eczema rubrum infantile" of American dermatologists) are due to the irritation of urine and fecal matters.

With regard to diagnosis, erythema neonatorum when it occurs in isolated patches may be confounded with some of the exanthemata, but its place of election and the lack of fever will distinguish it. Scabies, occurring as it often does in infants upon the buttocks by preference, may be mistaken for erythema (or eczema ?) but a careful examination will show the characteristic lesions of itch.

With regard to the second variety of erythema, the papular, this is less common than the first variety, but more apt to be mistaken for other affections. When fully developed it shows itself in the form of discrete flat round papular lesions of 4 to 5 millimetres diameter, more or less, and of a peculiar deep red, often brownish or violaceous tint, covered with a thin scale and surrounded by a somewhat firm ring of epithelium. The intermediate skin is natural or reddish in color, and occasionally shows brown patches, the remains of former lesions. Erosions sometimes nearly level with the skin, sometimes sunken are also met with at times. The lesions, which may vary from four or five to a dozen or two in number, are usually discrete but sometimes aggregated, and in rare cases form serpiginous patches. They are usually observed upon the buttocks, and most commonly near the crease, or they may occur upon the internal aspect of the thighs or upon the posterior surface of the calves. The lesions are also occasionally encountered on the posterior surface of the scrotum or upon the external face of the labia majora.

Parrot has expressed the opinion that this form of erythema is syphilitic, but this Sevestre denies. He says that if the papule is traced back to its origin it will be found to begin as a vesicle. That this vesicle denuded of its epidermal covering and irritated takes on a certain amount of induration and thus we have the elevated papule. The diagnosis is made by a general examination of the patient in whom no signs of syphilis are observed, the fact that the lesions are confined to the localities noted, and finally the observation of the course of evolution of the individual lesions which rapidly follow the transformations noted.

While infantile erythema cannot be said to be a grave affection, yet in the ulcerative forms it may become a matter of some moment because of the insomnia and cachexia which it may bring with it, and also because the open surfaces may afford a point of entrance to erysipelas and other morbid entities. For this reason the affection should be vigorously treated.

The first thing to do is to remove the cause when this can be done. If diarrhœa is present this should be checked. If chafing or the presence of smegma or other secretions are keeping up irritation these should be attended to. Locally infusions of elder flower or walnut leaves, solution of boric acid 1-30, bichloride of

mercury 1-2000 may be applied, or the mercurial can be used in a bath. After bathing, the infant is to be carefully dried with soft linen and powdered abundantly with starch, lycopodium, nitrate of bismuth or some similar powder. In some cases ointments suit well, as vaseline, simple or borated, or oxide of zinc ointment. Exposure to heat or cold should be avoided and it is scarcely necessary to add that extreme cleanliness is to be practised.

ERYTHEMA NODOSUM.—Mackenzie,³ as the result of an analysis of one hundred and eight cases of erythema nodosum, found acute rheumatism existing in thirteen cases and sub-acute in four cases. In seventeen additional cases arthritic pains, apparently of a rheumatic character and not merely due to the cutaneous lesions were present, making thirty-four cases altogether or thirty-one and four tenths per cent. in which rheumatism was found to be associated with erythema nodosum. In four cases of the one hundred and eight, there was evidence of endocarditis in the shape of an organic murmur developed during the course of the attack, and twenty cases in which such a murmur was found to exist at the time of admission to the hospital.

ECZEMA. Etiology.—Fortescue Fox,⁴ physician to the Scotch Springs of Strathpeffer, says that the etiological distinction of skin diseases as constitutional and local is perhaps the only classification expressive of a constant natural division. To both kinds of causes the skin is susceptible by present constitution or bias. If the bias is toward health morbid influences may be resisted, if toward disease a slight cause will excite it. The bias depending on period of life is mainly functional. That which is irrespective of age and shows itself as an hereditary or acquired tendency is on the other hand mainly structural.

To illustrate these points Fox gives brief notes of various cases. The eczema of youth, with a skin highly sensitive, of much functional activity, is not illustrated. The eczema of declining vitality presents a moist and extensive eruption at first, which subsequently tends to become dry and scaly and to be confined to the lower extremities. Fox gives the case of a man of 79, who was much benefited in this condition by the use of the sulphur baths.

“Relapsing moist eczemas in middle-aged women” usually show no relation to the gouty or other known diathesis. The eruption occurs usually in women of a full habit wherever heat,

moisture and friction co-exist. It is at first moist and may extend over a large area varying greatly from time to time. Indulgence at table or mental irritation aggravate the symptoms. In Fox's experience this form of eczema does not attack the hands or feet. Under appropriate treatment it recedes and becomes drier, but readily breaks out again unless the original causes be avoided. The warm sulphur waters of the Strathpeffer Spa seem to be especially grateful to these cases. An illustrative case was that of a woman of 40, suffering since her last confinement with moist and irritating eczema of the trunk and flexors. No gouty tendency, could be traced though the patient was stout and inclined to a stimulating diet. The latter was regulated, 12 ounces of the "strong well" were given twice daily, and sulphur baths thrice a week with great advantage.

The eczemas just described belong to a different class from those about to be mentioned; the latter show some constitutional element as a dominant factor. Localized dry eczemas in middle-aged women belong to this class. The eczema is usually situated in the hand, which early passes through a brief moist stage to become a dry chronic, and often intractable fissured eczema. Gout is often to be traced in the family.

Eczema in men, tending to become localized and dry and nearly always associated with gout, may likewise be classified under this head. An important distinction between this group of cases and the preceding as to the local effect is observed, namely, that other symptoms of gout have existed or do exist in the patient himself, whereas in women we must usually look to the family history. Very often in these cases some other manifestation of gout alternates with the skin disease. An illustrative case was that of a man of 50 suffering with eczema of two months' standing, and affecting the smaller joints of the hands and feet, especially around the fingers, with a scattering on the face. It consisted of papules on a livid, swollen skin, some suppurating and some semi-vesicular. Sulphur baths to the number of twenty taken at the Spa relieved the skin entirely.

The Strathpeffer Springs are warm sulphur springs situated in one of the loveliest parts of the Highlands of Scotland. What part the air may have in improving the general condition of patients

has not been fairly tested, but the hints thrown out by Fortescue Fox are worthy of all consideration.

Deligny has read a paper before the Medical Society of Rouen⁵ on eczema in rheumatic persons. He says that articular rheumatism may in these cases precede or follow the eruption or in some cases only "abarticular" symptoms, dyspepsia, migraine, hæmorrhoids, granular angina, bronchial catarrh, asthma, nervous disturbances, etc., may accompany the skin disease. Of course it is difficult to assert the rheumatismal characters of these symptoms, which are also characteristic of other diatheses, but the history often helps.

As regards localization, in Deligny's experience rheumatismal eczema most commonly occurs on the hands (15 cases in 80), then on the face and the hairy parts (11 cases), the scalp (9 cases), the genitalia (7 cases), the anus (6 cases), the feet (6 cases), etc. This frequency of eczema upon the hands in rheumatic cases causes Deligny to suspect this etiological factor in all cases occurring in this locality, particularly the papular or "lichenoid" kinds.

Deligny thinks that rheumatic eczema is moist and crusty, while gouty eczema is dry, pityriasis-like and itchy. These differential signs cannot, however, be relied upon. A better test would be the presence or absence of uric acid in the lesions in the blood or in the urine. He recommends the waters of St. Gervais.

Therapeutics of Eczema.—Lawrence,⁶ in a case of chronic eczema of the fingers, when "all other treatment had failed," employed a solution of ten grains of permanganate of potassium to the ounce of water, applied freely with a camel's hair brush. The disease disappeared in twelve days. Two other cases, one an infant, did equally well under this treatment.

Chace⁷ reports prompt and complete cures of eight cases of chronic eczema from the use of a solution of a drachm of resorcin in an ounce of glycerin applied with a camel's hair brush morning and evening.

Widerhofer⁸ rubs the eczematous patches with soap and wet flannel till a lather is produced, then wipes the surface dry and wraps it around night and morning with linen thickly smeared with lanolin having five per cent. nitrate of bismuth added.

L'Union Méd. recommends a solution of chlorate of potassium ten grains, wine of opium fifteen minims in an ounce of water.

Apply on bits of lint. This formula probably owes most of its virtues to the water, but its vitality is remarkable so that there may be more value in it than appears at first sight. It is unsuitable for acute cases.

Crocker having recommended blistering over the back of the neck and spine for the relief of certain cases of eczema, Brooke, of Manchester,⁹ corroborates his statements and adduces the case of a man of 28 who had been troubled for many months with repeated attacks of papular and vesicular eczema of the backs of the fingers and hands, occasionally extending to the backs of the forearms and almost always involving the right eyebrow at the same time. The idea naturally suggested itself that either a trophic or vaso-motor centre in the cord was in an unhealthy state of irritation, and with the intention of relieving this condition, Brooke applied some blistering fluid to the nape of the neck. The relief was very marked at the time, but the attack returned later and the patient was not able to have a blister reapplied. A second case exactly similar was quickly relieved in the same way. In a third case, that of a middle-aged otherwise healthy man who had long suffered from outbreaks of papular eczema on the arms and legs and whose occupation forbade the employment of a blister, Brooke ordered mustard paste to be rubbed down the spine with fairly good effect. Brooke recognizes the danger of applying blisters in any case of eczema when the disease is not evidently limited. It is often easy to light up a new patch of disease by such treatment.

Allan Jamieson¹⁰ had a patient affected with eczema of both palms, not due to occupation, which had been treated in vain for three years. Salicylic plaster muslin was applied and continued for rather more than three weeks until the palms had become tender and soon presented a pink appearance. They were then treated with equal parts of lead-plaster and vaseline, the hands being dipped in hot water each time the ointment was applied. A cure was effected in about six weeks.

In eczemas occurring about the menopause Cheron¹¹ recommends the following: \mathcal{R} Sodii arseniat., gr. $\frac{3}{4}$; aquæ destill., fʒiv-ʒij. M. Sig.—fʒj ter in die. Constipation should be relieved by a saline purgative, generally citrate of magnesia taken twice weekly. An application of the following ointment laid on gently should be made every evening: \mathcal{R} Hydrarg. precip. alb., gr. xv; vaseline, ʒv;

ess. rosarum, ℥ij. Every eight or ten days the following hypodermic injection should be employed: R̄ Pilocarpin nitrat., gr. iss; aquæ destill., ℥lxxv.—M. Six drops to be injected. Contra-indicated in diseases of the heart or great vessels.

EROSIVE CATARRHS DUE TO ANIMAL PARASITES.

SCABIES.—Kaposi,¹² in a clinical lecture on the treatment of scabies, says that besides sulphur are used solutions of certain metallic salts, as sulphate of copper, also petroleum, balsam of Peru, styrax, soaps, pix liquida and other preparations of tar, also a great variety of the etherial oils, as juniper, rosemary, cloves, etc. In old times it was customary to place the patient in a bath, rub him with soap, then anoint him with some sulphur or mercurial preparation, after which, being wrapped up in blankets and given a diaphoretic drink, he was allowed to sweat.

A rational treatment of scabies must proceed from a definite standpoint. The question must be decided, what remedy, which method and under what circumstances it should be used. Scabies is an eczema (or an erosive catarrh) produced by a particular cause, a cause which continues to exist, viz., the *acarus scabiei*. The first indication, therefore, is to remove the cause. If the eczema be cured by itself the insect will continue to irritate the skin and the patient will still have the disease. A remedy must therefore be used which will destroy the insect and its eggs. Such a remedy acting chemically may produce an eczema (or dermatitis) by itself, therefore it is important to use that remedy which will most quickly destroy the insect and its eggs and at the same time cause the least irritation of the skin and even relieve the eczema. Certain remedies for scabies cause eczema, and one can never know when the scabies ceases and the eczema begins. The treatment of scabies is only completed when the eczema produced by it is also cured. In the milder form an application of an efficient remedy suffices, but when the disease has lasted months and the accompanying eczema has become intense then several applications are necessary to complete the cure. Kaposi considers the following the best remedy: R̄ Flr. sulphuris, ol. rusci, āā ptes. xx; sapon. vir., ptes. xl; pulv. cretæ alb., ptes. v; adipis, ptes. xl.—M. The ointment is brownish black and every furrow is injected by it, the epidermal layer shrivels up and the eczema is somewhat improved.

The employment of naphthol, which Kaposi claims to have introduced, adds a valuable remedy to those employed in the treatment of scabies. It can be used when the smell of tar is objected to, and takes the place of that ingredient in the prescription. Kaposi's formula is this: \mathcal{R} Naphtholi, \mathfrak{z} i; saponis viridis, \mathfrak{z} iv; adipis, \mathfrak{z} vj- \mathfrak{z} ij; pulv. cretæ albæ, \mathfrak{z} ii.—M.

The patient is anointed with this ointment without any bath previously, whereby the skin might be irritated. The ointment is applied only once while the Wilkinson's ointment (that given first) requires always two applications. After the application the patient should lie quietly in bed for a few hours between woolen covers. Kaposi prefers the naphthol ointment in almost all cases of scabies, but uses the Wilkinson's ointment when there is much eczema.

Fournier's treatment of scabies begins by a thorough application of soap followed by a full bath. After this the following ointment is well rubbed in over the whole body: \mathcal{R} Sulphuris sublimat, \mathfrak{z} j; sodii carbonat., \mathfrak{z} iv; glycerinæ, \mathfrak{f} zj; gum tragacanth, gr. v. After this a second bath is taken; the personal and bed linen should be carefully laundried, and gloves which have been worn should be burned. On the day following, emollient baths and the use of powdered starch or of glycerite of starch will be found useful.

Cubello Calvo recommends the following: \mathcal{R} Hydrarg. bichlor. corros., gr. viij; alcoholis, \mathfrak{z} j; aq. destillat, ad. \mathfrak{f} zj.—M. A very agreeable remedy compared to those usually employed, but certainly a very dangerous one. It should be used only over a very limited area.

PEDICULOSIS.—Greenough¹³ points out the proportionately large percentage of pediculosis (6 per cent.) among skin diseases in Boston over that presented by other large cities of the United States during the past year, and gives a table of the comparative frequency of the disease.

The statistics of the American Dermatological Association for nine years past shows that the ratio of cases of pediculosis to the whole number of skin affections reported from Boston is a little less than $5\frac{1}{2}$ per cent.; from New York a little over 3 per cent; from Philadelphia a little over $3\frac{1}{3}$ per cent.; from Baltimore $2\frac{1}{8}$ per cent.; from St. Louis less than $1\frac{1}{2}$ per cent.; from Chicago less than 3 per cent., and the same ratio from Canada. The cases of

pediculosis capitis met with in Boston are much more numerous than in any other city—a fact which Greenough attributes to the custom of calling cases *eczema capitis* elsewhere which in Boston would be called *pediculosis capillitii*.

The three varieties of *pediculus* which cause the cutaneous affections classed under the heading of *pediculosis* are the *pediculus capitis*, the *pediculus corporis* and the *pediculus pubis*. They each occupy a certain region of the body and do not as a general thing encroach upon each other's territory, the *pediculus capitis* confining itself to the hairy region of the scalp, the *pediculus corporis* to the body, and the *pediculus pubis* to the pubic region and axilla. When transplanted from one individual to another they may get off their own proper ground, but if such is the case they soon get back there, as they are very rarely seen except in their own locality. Of the three the *pediculus capitis* is the most frequent, occurring in 500 cases out of 914 of *pediculosis* of all kinds seen by Greenough. As regards sex 81 males were seen to 419 females. Of the 81 male cases 34 were boys 5 or under, 25 between 5 and 10, 19 between 10 and 15, and only 3 above the age of 15. In the females 74 were 5 or under, 172 between 5 and 10, 116 between 10 and 15, and the remaining 57 cases are scattered along, diminishing in number in each 5 years of age.

That the *pediculus capitis* produces any lesion of the scalp by its bite is very doubtful; that when present in any number they will cause a very decided cutaneous trouble there can be no doubt of at all. It is, however, such as can in no way from the character of the efflorescence be distinguished from an *eczema* of the scalp, varying in intensity from a congested scaly form to an acute pustular one, according to the number of the parasites present or the susceptibility of the patient to irritating influences. Of course situation, distribution, etc., help to make the diagnosis in practice.

An invariable accompaniment to the presence of lice is the existence of ova or nits. These are very characteristic pear-shaped semi-transparent bodies attached to the shaft of a hair. When only a few lice are present they are generally attached to the hair from one to one and a-half or two inches from the root, invariably with the sharp end toward the root, that is to say, the egg is laid by the louse with its head pointed toward the scalp. When the

nits are very thick they will be laid nearer and nearer to the root, sometimes almost touching one another. Sometimes in the case of women or girls with long hair they may be found on the shaft farther toward the end of the hair; but as a rule they are within two or at most three inches of the scalp end.

The parts of the head that are most likely to show this cutaneous irritation are the occiput and crown, especially the former. If the patient has been infested by the parasite for some time a papular eczema may be found on the back of the neck, and even extending down on to the shoulders. The post-cervical glands also may be found enlarged, especially in the case of children, and frequently it is this enlargement of the glands that causes the mother to seek medical advice.

The diagnosis of *pediculus capitis* is always easy, although it may sometimes be difficult or impossible to find the lice. Cases of *eczema capitis* confined to the back part of the head, especially in children, may always be safely set down as due to *pediculi* and treated accordingly.

The treatment must involve not only the destruction of the *pediculi*, but the removal or at least the devitalization of their nits. Greenough has found nothing so efficacious for routine dispensary practice as an ointment of carbolic acid in the strength of one to sixteen or one to thirty-two made with ung. petrolii. This not only destroys the *pediculi* but sterilizes the ova. In a few very bad cases when the whole scalp is a mass of crusts Greenough uses for a few days some tar preparation diluted with cod-liver oil.

It is best in many cases not to tell patients that they have lice, but simply to order the treatment and direct strict cleanliness afterward. Combing with a fine-toothed comb dipped in vinegar will remove the nits. It should not be used until the scalp has lost its acute soreness.

The *pediculus corporis*, more properly called *pediculus vestimentorum*, since it lives in the clothing is very much like the *p. capitis*, but larger and somewhat longer in proportion to its breadth, and shows a blackish tinge on the back, to which fact is probably due the name "gray-back" used by sailors. In Greenough's tables it stands second in frequency the number of cases recorded, being 337 to 500 of *pediculosis capitis*. It is more frequent among males, 196 of Greenough's cases being males and 146 females.

The relative age of the patients is also reversed, both sexes being more liable to pediculosis vestimentorum the older they grow.

The pediculus corporis undoubtedly does cause a lesion of the skin by its bite, namely, a congested infiltrated raised papule. This gives rise to intense itching, and patients often excoriate themselves deeply. It is not known whether or no the *p. vestimentorum* does or does not leave the clothing to prey upon its host. It is very rare to find the parasite upon the epidermis, and its ova are also laid upon the clothing. This makes the diagnosis at times a matter of some difficulty. Even when quite plentiful the pediculi are not always easy to see. They hide in the seams of the clothing and must be carefully sought for. Generally, however, the nits are more apparent. They are smaller than those of the pediculus capitis and are attached to the fuzz of woolen clothes, or on the threads of seams. Another evidence is often found in small dark minute spots on the white underclothes which are the feces of the louse. The main diagnostic point, however, is the distribution of the cutaneous irritation on the body. Those parts where the body is brought into most intimate contact with the clothing, as the shoulders, in persons with a full chest, the breast and the waist or girth. The outside of the arms, anterior aspect of the thighs, etc., will be more or less affected in proportion to the severity of the case. The lesions are congested papules, more or less excoriated deep-furrows, caused by digging into the epidermis with the nails, excoriated patches and even furuncles; never in Greenough's experience the moist or pustular eczema seen often as the result of the irritation of scabies especially in the region of the supinators on the forearm. In cases of long standing, there is apt to be pigmentation and when furuncles on the thighs have been started we may have an inguinal adenitis.

It is sometimes difficult in the aged to distinguish between pediculosis and pruritus senilis. Here the above points as to locality, etc., must be brought to mind.

To treat pediculosis corporis we have simply to disinfect the clothing. To do this it is only necessary to expose it to the degree of heat at which albumen coagulates, to kill the lice and also to sterilize the ova. In hospitals ovens can be employed. In private practice the woolen garments can be ironed along the seams and creases while the underclothing can be boiled. A car-

bolic wash is sufficient in most cases as an application to the body. Where there are severe lesions these must be treated as required.

In ordinary dermatological practice as shown by Greenough's tables pediculosis pubis is much less common than the other forms. All but one of his cases were males, and most of them were between the ages of 15 and 30. This seems to point to a probable sexual origin. Among young children *p. pubis* is apt to occur upon the eyelashes, which Greenough accounts for by supposing that the child had slept with an adult infested with crabs and had snuggled up with its head under the axilla.

The *pediculus pubis* is only found on those parts of the body which are furnished with stout curly body hair like that of the beard. From the pubis they wander up the median line of the abdomen and thus reach the sternal hairs and the axillæ. They may also be found at times on the anterior aspect of the thighs, the lower legs and even on the hairs on the dorsum of the phalanges of the toes as well as the beard, moustache and eyelashes. Their position is a very peculiar one as they are always found at the root of a hair, and apparently clasping the shaft with their anterior claws. The ova is about the same size as that of the *pediculus capitis* but rounder. It is attached somewhat nearer to the root end of the hair.

The diagnosis of *pediculosis pubis* is rarely difficult, but it may be so when only a few of the parasites are present. We must usually rely upon the presence of nits upon the hairs. Whether the *pediculus pubis* gives rise to any idiopathic lesion upon the skin Greenough finds himself unable to say.

The treatment is usually not difficult. When severe, especially if the severity has been caused by irritants, emollients, rest and tepid bathing should first be employed; as the case yields, a mild solution of the bichlorides, balsam of Peru, solution of boracic acid, etc., may be used.

The means by which the three forms of *pediculi* spread from one individual to another are interesting and important. The *pediculus capitis* is usually carried home from school or from the play ground by exchanging caps, and at home by the use of brushes, combs, etc., in common. Among the better classes horse cars, sleeping cars or railroads, etc., must be held responsible.

Servants also are the means of contaminating members of their master's families, especially the children.

The *p. corporis* is almost entirely confined to the lower classes or to old persons of respectability living in reduced circumstances. The wearing of cast-off clothing and herding together as in lodging houses, police stations, etc., afford opportunities for conveying the disease. The cases which occur in the better classes may be explained by the use of public conveyances, travelling and juxtaposition to dirty individuals in crowds.

The *pediculus pubis* as met with in public practice is almost always conveyed by actual contact in sexual intercourse, but in private practice it may certainly be conveyed innocently.

Diagnosis.—Goldenburg¹⁴ calls attention to the diagnostic distinctions between *impetigo contagiosa* and *scrofulosis* on one hand and *pediculosis* on the other. The eruption which is excited by *pediculosis capitis* is very much like that of *impetigo contagiosa*. The main point of difference is the closer resemblance of the *pediculosis* eruption to *eczema* and its favorite locality at the edge of the hair behind and extending downward toward the shoulders. By lifting up the back hair and carefully examining under it *pediculi* or at least *ova* may almost always be discovered if this is the disease present.

Kaposi has remarked that cases of *pediculosis capitis* have been treated by internal remedies for months and years for *eczema* or *scrofulosis* without a diagnosis having been made.

Since among the laity and even in some medical circles, enlargement of the cervical glands is believed to point infallibly to *scrofulosis* and thus is justly dreaded, too much weight may be laid upon this symptom in forgetfulness of the fact that with the temporary cause of the enlargement of the glands this enlargement itself will disappear.

Usually the blanched and hollow cheeks of the poor children tortured by nocturnal itching with the *eczematous* eruption which shows itself as in *scrofulosis* about the eyes, nose, mouth and ears causes the eruption to be taken for a *scrofulous eczema*. Again however it will be observed that the *eczema* disappears when the lice are destroyed.

Finally Goldenburg calls attention to the fact that a large

number of cases of so-called recurrent blepharitis and conjunctivitis in children are due to pediculi.

DEEP-SEATED INFLAMMATIONS.

BISKRA BUTTON known also as *Bouton d'Alep*, or *de Gassa*, *Clow de Biskra*, etc., is the subject of a brief report by our correspondent, Dr. Doyon, of Lyons. Bouquet, a pupil of Vidal, has published an exact clinical description of the disease, while Chantemesse has studied the parasite which causes it and confirms the statements of Duclaux that it is due to a microbe entirely distinct from that of ordinary suppuration. The microbe appears in the form of isolated points of diplococcus or zoöglea. It is easily cultivated in gelatine or potato. Inoculation of the culture upon the rabbit or upon man produces a lesion similar to that of the disease as occurring naturally. Poncet in examining sections of *Bouton de Gassa* has found in addition to the organism described by the above observers a bacillus which occupies the intercellular spaces of the epithelial layers and like the micrococcus is never found in the derm in the embryonal tissue nor in the protoplasm of the embryonal cellules.

ERYSIPELAS.—*Erysipelas and Erysipeloid Affections following Vaccination and Vaccinia*. Gatzen¹⁵ says that the very considerable number of affections which complicate vaccination are worthy of more attention than they have as yet received, although most of them are mild and harmless in their nature.

The question of the red areola and its relation to the vaccination process, for instance, has never been thoroughly discussed, and authors are by no means agreed as to its nature. Gatzen endeavors to elucidate this subject and also to examine into the etiology of vaccinal erysipelas,—the most important complication of vaccinia. and, it must be admitted, the result in many cases of the use of animal vaccine. The question here arises whether vaccinal erysipelas arises under all circumstances as the result of an accidental infection. For, if Bohn is correct, the potentiality of erysipelas exists in all vaccinal lymph, from which it follows that all cases of vaccinal erysipelas, excepting such as result from direct infection of the vaccination wound, are vaccinal and not accidental. We may here call to mind what Bohn calls late erysipelas, when the red areola, instead of lasting ten days, as is the rule, passes beyond

the original boundary, commonly with high fever and occasionally involving a considerable area of the general surface.

Unfortunately, the literature of the subject is wanting in fully reported cases. As Gatzert says, we can only expect a satisfactory answer to the various questions arising in this connection as the result of bacteriological research. It is, indeed, remarkable in the present state of our knowledge that no microscopic research has up to this time been published on vaccinal erysipelas in connection with the normal areola, although a number of fatal cases have been reported within the past few years.

By way of introduction to the account of what Gatzert has observed and noted, he gives some account of the ordinary course followed in the development of the vaccinal lesion. This is various, according as the vaccinated subject may or may not have been vaccinated or have suffered variola previously. In unvaccinated persons the course is uniform. Among the latter a small papule appears on the fourth day after vaccination, which in twenty-four or thirty-six hours develops a vesicle. The inflammatory process, which in a peculiar way changes the papule into a vesicle, develops in a centrifugal direction from the point of vaccination, so that the papule is raised upon a red base. Papule and vesicle are to be regarded as the results of a higher grade of that inflammation of the tissues, which has been evoked by the vaccination. While the vesicle is increasing in size up to the seventh day the circular dermatitis extends to a greater or less degree in the neighborhood, and this dermatitis, which is never absent, although sometimes very narrow, keeps on extending until the end of the ninth or the beginning of the tenth day. When the course of the affection is normal the extension of the redness ceases on this day, the centre near the pock becomes lighter and then the circumference also, and on the tenth day there is frequently observed near the already cloudy pustule a pale red or colorless circular areola, surrounded by a peripheral red ring three or four centimetres from the middle point. Finally this last local symptom of the vaccinal process disappears, and then remains only the regenerative process, which had already begun in the pustule on the eighth day and now goes on to drying, crusting and scarring.

Two questions here suggest themselves: how is the appearance of the red areola to be accounted for, that is, what is its

cause? Is it dependent upon the vaccinal poison or only an accidental circumstance? And, second, how can we account for the fact that in persons vaccinated for the first time the areola reaches its extreme development so regularly upon the tenth day?

After a long citation of various authors with illustrative cases, Gatzen says that when these are considered together, but little doubt can remain that the initial exanthem of variola is nothing more than an exanthem-form of the poek,—a symptom displayed by the variola fungus in its development in the skin. For this reason it is a highly erysipeloid process of a variolous character, most likely alone dependent upon and occasionally favored by some earlier variolous or vaccinal affection which had failed to give entire immunity, or where the immunity had in time become impaired.

The study, then, of the symptomatology of the poek and of vaccinia, the clinical investigation of variola and vaccinia, shows that in the course of both infectious diseases, which are each dependent upon identical processes, erysipeloid changes may occur as well in the neighborhood of the point of inoculation as in the general surface,—sometimes regularly, sometimes only under certain local circumstances as specific variolous exanthemata. Variolous poison here shows itself as one of those bacterial infectious poisons which are capable of inducing erysipeloid processes. We now know that such processes not only occur directly by means of the so-called erysipelatous contagion, but clinically identical processes may also be called out by other bacteria. Koch and Loeffler have shown that a peculiar bacterium, of extraordinary minuteness, which is fatal to mice by superinducing septicæmia, causes, when inoculated in the ear of rabbits, a progressive erysipeloid inflammation. To this class belongs the bacillus of hog-erysipelas which causes erysipelas in rabbits as well as in certain kinds of swine. Recently, cases of typhoid complicated with erysipelas have been reported from Zurich. Here, while some lymph spaces of the cutis were found filled with the minute micrococci of erysipelas, others showed long bacilli supposed to be typhoid bacilli. Though this observation has not as yet been confirmed, yet it seems probable that erysipelas may be found to be caused by various infectious matters.

If these views are to be regarded as worthy of credit, the

specific contagium of vaccine and variola possesses the quality of producing a process analogous in all respects to erysipelas.

While then the areola is erysipelas-like in its appearance and course, why does it run such a regular ten-days course? This question has not as yet been satisfactorily settled, although the fact is known that immunity dates from this period. The few cases in which the areola extends after the tenth day, with continued fever, etc., are due, one author thinks, to secondary heterogeneous infection. The fact that this late erysipelas is often observed after animal vaccination leads Gatzen to believe that this is less effective than humanized lymph.

The prophylaxis of accidental vaccinal erysipelas belongs to the general domain of antisepsis and need not be further examined into. Vaccination with active lymph in a number of places so that by the tenth day the utmost immunity possible, can be attained, the taking of vaccine matter from as few points as possible only when there are a number of pustules and always leaving at least three unopened.

As to therapeutics, Gatzen says he has no personal experience. He suggests, however, inoculations at various points near the origin of the disease, or repeated vaccinations, so as to accustom the body as early as possible and gain immunity. It is also thought by some that the diligent inunction of mercurials in the neighborhood of the affection may serve to destroy the fungus.

Paralysis of the Four Extremities following Facial Erysipelas.—Brieger¹⁶ gives the case of a girl of fifteen who, during convalescence from an attack of facial erysipelas, suffered with vague pains in different parts of the body, which after a time were limited to the region of the upper dorsal vertebræ, from which they radiated to the shoulders and down both arms. The pain was of a lancinating character, and occurred in paroxysms of short duration. In three months and a half after the erysipelas, when the attacks of pain were severest, complete paralysis of the right arm set in. During subsequent days the left arm, right and left legs became successively affected. The paralysis was attended by abnormal sensations and exaggerated tendon reflexes. Finally the muscles of the neck and bladder were attacked with paralysis, while the abdominal muscles remained intact. The electrical excitability did not undergo any change, and the sensibility, particularly of the

lower extremities, was markedly diminished. At the same time atrophy of the muscles on the right side rapidly developed. Brieger thinks that the palsy could not be attributed to a peripheral neuritis, inasmuch as the faradic and galvanic excitability of the muscles remained normal. He thinks it due to gross changes in the spinal cord resulting from the local accumulation of erysipelas cocci. The paralysis entirely disappeared under the use of the constant current with iron and iodide of potassium. The translator does not think that the state of the electrical excitability entirely excludes the idea of peripheral neuritis. The development of one-sided atrophy makes the case a puzzling one.

Artificially Produced Relapse of Erysipelas.—Born, of Cöthen,¹⁷ gives an account of a case of erysipelas which was extensive and accompanied by a good deal of fever. After it had disappeared the patient remained in good health for six days, being only inconvenienced by the presence of a dried film of carbolic oil which had been used to anoint the affected surface. At the end of this time a thorough bath with soap and water removed the oil. The same evening the patient experienced rigors, her temperature rose and she suffered a second attack of erysipelas. There is not much doubt but that the germs which were lying dormant in the carbolized oil were rubbed into some abrasion of the surface and reinoculated. (During the reporter's residence at the Pennsylvania Hospital in 1870-1 the monthly scrubbing of the wards, which was done by the lay authorities against the protests of the medical staff, almost invariably resulted in an outbreak of erysipelas. A. V. H.)

Retro-bulbar Neuritis following Erysipelas of the Face: Cure.—Weiland¹⁸ gives the case of a girl of sixteen who had suffered from erysipelas of the upper right half of the face with tumefaction of the eyelid, so that the eye was tightly closed. When the œdema of the lid had diminished, the sight of the eye was found to have become completely abolished. The eye was not affected by inflammation. Amaurosis only was present. The pupil was slightly dilated, but reacted tolerably well under the influence of light. The cornea, iris, etc., seemed intact. On ophthalmoscopic examination the papilla was dull with indistinct borders. The vessels were blurred so that the arteries and veins could with difficulty be distinguished from one another. However, on pressure

with the finger, pulsation could be perceived. The retina everywhere else was normal. The patient's condition was excellent.

During the following days the papilla gradually reassumed its transparency, and by the end of the week the patient could perceive for the first time the movements of his hand. The pupil was narrow. Little by little the perception of colors returned and normal vision. The treatment consisted in hypodermic injections of pilocarpin and strychnia.

Cases of this kind, Weiland remarks, are very rare. Amaurosis may be produced in erysipelas as the result of invasion of the cellular tissue of the orbit by the process, by a phlegmon or an abscess compressing the vessels of the orbit and compromising the retinal vascular supply, or even possibly a thrombosis of the retinal veins following a similar lesion of the veins of the eyelids. Or a retro-bulbar neuritis is possible. Knapp has collected thirty-seven cases of amaurosis consecutive to erysipelas, which he regards as resulting invariably from orbital cellulitis.

In Weiland's case the absence of pain, of exophthalmos and of motor troubles excluded the hypothesis of orbital cellulitis. In opposition to the presence of thrombosis the ophthalmoscopic appearances showed no apoplexy. Embolus and meningitis were also excluded by the absence of cerebral symptoms and the unilateral character of the lesion. By exclusion, then, we are brought to admit a localization to the trunk of the optic nerve, a retrobulbar neuritis. The complete cure of such a case is unusual. It augurs better from the point of view of prognosis for these cases when the invasion has been rapid.

An Epidemic of Erysipelas.—Schniver¹⁹ gives an account of a patient admitted to the service of Zaleski at the Rudolph's Hospital with erysipelas of the face, who communicated the affection to no less than six fellow patients, nine surgical cases, and all confined to bed in the same or neighboring wards. Each case began by chills, which occurred just as the contaminating person began to desquamate. The affection was in each case confined to the face, showed similar changes in temperature, and ran an acute course in six to eight days.

Schniver thinks that in the absence of specific means of treatment in erysipelas, antipyretics internally and carbolated lotions externally offer the best form of treatment. The body should be

kept covered with some unctuous substance during the period of desquamation.

Idiopathic Erysipelas followed by Gangrene.—Dr. Mitchell,²⁰ of Cohoes, N.Y., gives notes of two cases of erysipelas. The first of these was that of a wool-picker, 48 years of age, who had been complaining for two or three days of a burning and prickling sensation in the right cheek, which he attributed to a burr from the wool he had been picking having penetrated the skin. On examination no wound abrasion or foreign body could be found. The cheek was swollen and also the submaxillary glands, the skin being inflamed, of a bright red color with a yellowish tinge. The patient had chills, headache, pain in limbs, intense nausea, vomiting and even loss of appetite. The pulse on that and subsequent days ranged from 100 to 140, and its temperature from 103 to 105, with delirium and coma. There was intense œdema with dusky redness. The redness became darker, especially over the region of the right submaxillary gland. After some days the redness became more circumscribed, of an oval shape, and a slough formed over the submaxillary gland four or five inches in length by two to three in width, which separated, leaving a healthy ulcer which gradually healed over.

Hepatic Erysipelas.—Under this title Boucher²¹ gives the case of a woman of 63 who complained of chills and fever with hepatic pain which had come on suddenly the night before. She had had some years previously an attack of erysipelas preceded by a similar pain in the hepatic region and now she complained of pain and burning referred to the liver as if it had been the seat of deep inflammation. No enlargement of the organ could be perceived, however. Suspecting inflammation of the liver, Dr. B. placed the patient upon appropriate treatment. On the third day of fever the pains in the liver decreased and ceased when the patient was seized with dryness of the throat, pain in the ear, and within twelve hours developed a well-marked facial erysipelas confined to the right side which ran a rapid course and soon disappeared.

Boucher believes that the affection began in the liver, passed up the intestine to the stomach, up the œsophagus, pharynx, etc., to terminate on the face as described!

Erysipeloid.—Rosenbach, of Göttingen,²² says that this affection to which he also gives the name of “erythema migrans” is pro-

duced by a microbe, which is neither a bacterium nor a bacillus: it seems to belong to a peculiar species. Erysipeloid is characterized by an eruption which is only observed in cooks, barkeepers, etc., and occurs only upon the hands and fingers. A swelling of a deep red color or livid develops and progresses slowly with sensations of smarting or burning, up from the ends of the fingers to the metacarpal region, which it reaches at the end of five to eight days. At the end of one to three weeks the affection disappears. Rosenbach thinks the affection due to a microbe resembling the *cladotrix dichotoma* of Cohn, but much smaller. The affection must be very rare in America, at least, as the reporter has never met with a case nor heard of any affection running a similar course.

Treatment of Erysipelas.—New remedies for erysipelas are constantly being brought forward. The following have been recently suggested: Nussbaum has treated five consecutive cases of erysipelas of the extremities successfully with the application of ichthyol and vaseline (proportions not given). Fraipont recommends bichloride of mercury, bathing the part in a solution of 3:1000, irrigating wounds with the same and covering wounds with iodoform gauze wet with the solution, while the red portions of the skin are coated with tar extending a little beyond the diseased border. The whole is then covered with a wet dressing made with "*eau blanche de Burou*." In four cases thus treated a rapid cure resulted. Dr. Jorissenne has succeeded in treating facial erysipelas with a mixture of vaseline, butter of cocoa and a "sufficient quantity" of bichloride of mercury. Although absorption takes place slowly the progress of the disease is immediately arrested. The parts should first be washed with a mixture of bichloride and aromatic wine!

In addition to the genial uncertainty of the terms used, "a mixture," a "sufficient quantity," etc., the reporter is of opinion that whatever virtue may reside in the last formula must be due to the excess of aromatic wine, as all the mercury must be thrown down as insoluble tannate, so that those contributions to the therapeutics of erysipelas are not highly valuable. Haberkorn brings forward benzoate of sodium as an efficient antiseptic for erysipelas and other cutaneous disorders. He administers from three to five drachms of the drug daily in a mucilage of seltzer water and makes no local application. The medicine is kindly borne, and reduces

the temperature to normal within forty-eight hours, the redness also rapidly disappearing. Dr. Archangelski prefers the following applications, in the order named: (1) Benzoic acid; (2) tinct. iodine and turpentine as ointment; (3) sulphate of copper; (4) sulphate of iron; (5) oxide of zinc; (6) naphthalin; (7) solution of perchloride of mercury; (8) chloride of zinc; (9) iodoform.

Sir Dyce Duckworth recommends chalk ointment. Though *creta preparata* is amorphous and *calcei carbonas precipitata* is a crystalline powder, it appears to be quite immaterial which is used, if pure. To secure suitable consistency and to insure full benefit, it is necessary to incorporate a large amount of chalk in the ointment. Lard will blend with an extraordinary quantity of chalk, either by beating in a mortar or by adding it gradually to the lard, previously melted. It is possible to make a very dense ointment by blending two and a half ounces of chalk with one ounce of lard, but the best proportion is equal parts, the lard being previously melted. Half a drachm of pure carbolic acid may be added to each ounce of the ointment. The ointment is spread on with the finger and covered with plain lint or boracic lint. In severe cases it may be necessary to change the ointment twice in twenty-four hours.

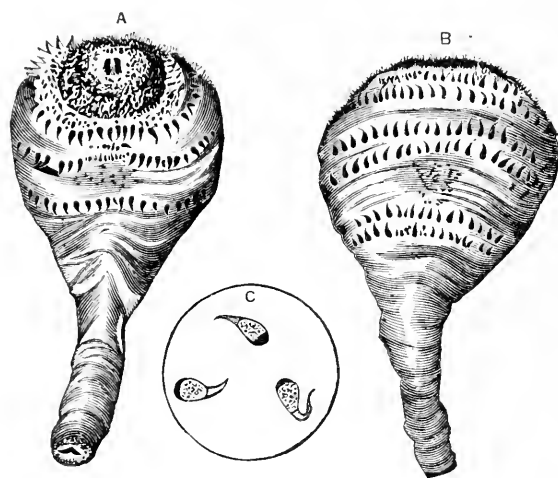
LARVÆ OF DERMATOBIA IN THE SKIN.—Matas, of New Orleans, in a paper read before the New Orleans Medical and Surgical Association, gives the case of an Englishman who, while in Honduras about two weeks previously, had been stung by a peculiar fly well known in that country.

On examining the patient, three hard, red, furuncular swellings were seen situated about the intergluteal furrow. The largest was elevated about a quarter of an inch above the level of the skin, and with its inflammatory areola was about an inch and a quarter in diameter. A minute orifice could be seen in its centre. An incision was made entirely through the skin, and the larvæ were with some difficulty pressed out. (The natives of Honduras usually apply hot tobacco ashes with digital expression.) The wound was cauterized with pure carbolic acid and healed kindly.

On examination the larvæ were found, when mounted, smaller than they appeared during life (see fig., c), having contracted slightly. The largest measured about 4–5 mm. in its long diameter and was about 1.5 mm. in breadth. To the naked eye they

presented an elongated pyriform or clavate appearance, the broad, thick and rounded portion corresponding to the head and trunk, which were the parts farthest from the surface of the skin. The long, tapering or caudal extremity pointed upward, so that in squeezing the larvæ out of its lodgment the tail end appeared first. As the caudal extremity presented itself, a dark red dot was visible at the very tip, the anal extremity, containing the stigmata for respiratory purposes. This is characteristic of, though not peculiar to, the *dermatobia* larvæ.

Under the microscope, the greater part of the parasite was seen to consist of an elongated pyriform body, apparently concave on



LARVÆ OF DERMATOBIA.—A. Ventral aspect, enlarged. B. Dorsal aspect, enlarged. C. Larvæ, natural size.—(*N. O. Med. and Surg. Journal.*)

the ventral aspect, and convex dorsally, terminating in a long, tapering, glabrous, elongated pyramidal extremity. The broader and truncated part of the larva was opaque, and none of the contained organs could be distinguished. The external surface presented the curious appearance which is well displayed in A B. Corresponding with the three dark zones distinctly outlined with the naked eye could be seen three double rows of black hooklets or spines, which were distinctly shaped, when examined carefully, like the thorns of a rose stem. They were lamelliform, sharply pointed at the ends, and were curved and directed (the majority) toward the caudal extremity so that if imbedded in the tissue

lining of the larval sinus they would offer resistance when the tail was pulled upon. In addition to the three rows of hooklets a large number of small punctiform and brownish tuberosities could be seen dotted in a somewhat concentric manner above the upper row, on the two upper segments and the vicinity of the oral point.

In Matas' opinion these "beef or screw worms of Honduras," as they are there called, are the larvæ of a species of gadfly, classed in an order known as the dermatobia (from *derma*, skin, and *bios*, life) and common both to man and the lower animals.

ANGIO-NEUROTIC DERMATOSES.

BULLOUS ERUPTION DUE TO IODIDE OF POTASSIUM.—Our correspondent, Dr. Levison, of Copenhagen, cites a case from Haslund where a man of 27 was given four teaspoonfuls of a 5 per cent. solution of iodide of potassium (= gr. xij) in a day. At the end of that time the patient displayed bullæ of a centimetre in diameter over the trunk and limbs. The iodide was stopped, and after some days the bullæ dried up, leaving crusts which became gradually detached. The repetition of the iodide of potassium roused a fresh eruption of bullæ. (The pemphigoid eruption due to iodide of potassium was first described by Bumstead, of New York, and later by Hyde, of Chicago. It is among the rarest of the numerous eruptions which may be excited by this drug in persons having an idiosyncrasy against it.—A. V. H.)

IMPETIGO HERPETIFORMIS.—Duhring has desired to include under the one general term of "dermatitis herpetiformis" a group of symptoms varying considerably in different cases, but having certain general features in common, and including a number of cases variously classed as pemphigus, herpes circinatus, etc. The term "impetigo herpetiformis" was invented by Hebra to designate certain cases which Duhring desires to include in his dermatitis herpetiformis. Kaposi²³ objects to this view and strongly defends the use of his pet term to define a certain limited number of cases. The affection has suffered, says Kaposi, at the hands of its friends, many cases of herpes and of pemphigus having been described as cases of impetigo herpetiformis.

To clear the ground and limit impetigo herpetiformis, we must first recall the fact that impetigo implies pustules, while herpetiform signifies merely that the eruption is arranged like

herpes, that is in groups and bands, and that it undergoes similar central involution while spreading on the periphery. Perhaps it would be better to call the affection "*impetigo circinata et iris*," for this would disassociate the disease with the idea of herpes and would refer only to the arrangement of the pustules. Impetigo has nothing in common with herpes. By *herpes* we understand vesicles,—that is, transparent efflorescences filled with clear serum, breaking out acutely in groups and circles, and only becoming turbid and purulent after some days, usually with other signs of involution. By *impetigo* we understand purulent efflorescences beginning as such and remaining purulent through their entire course.

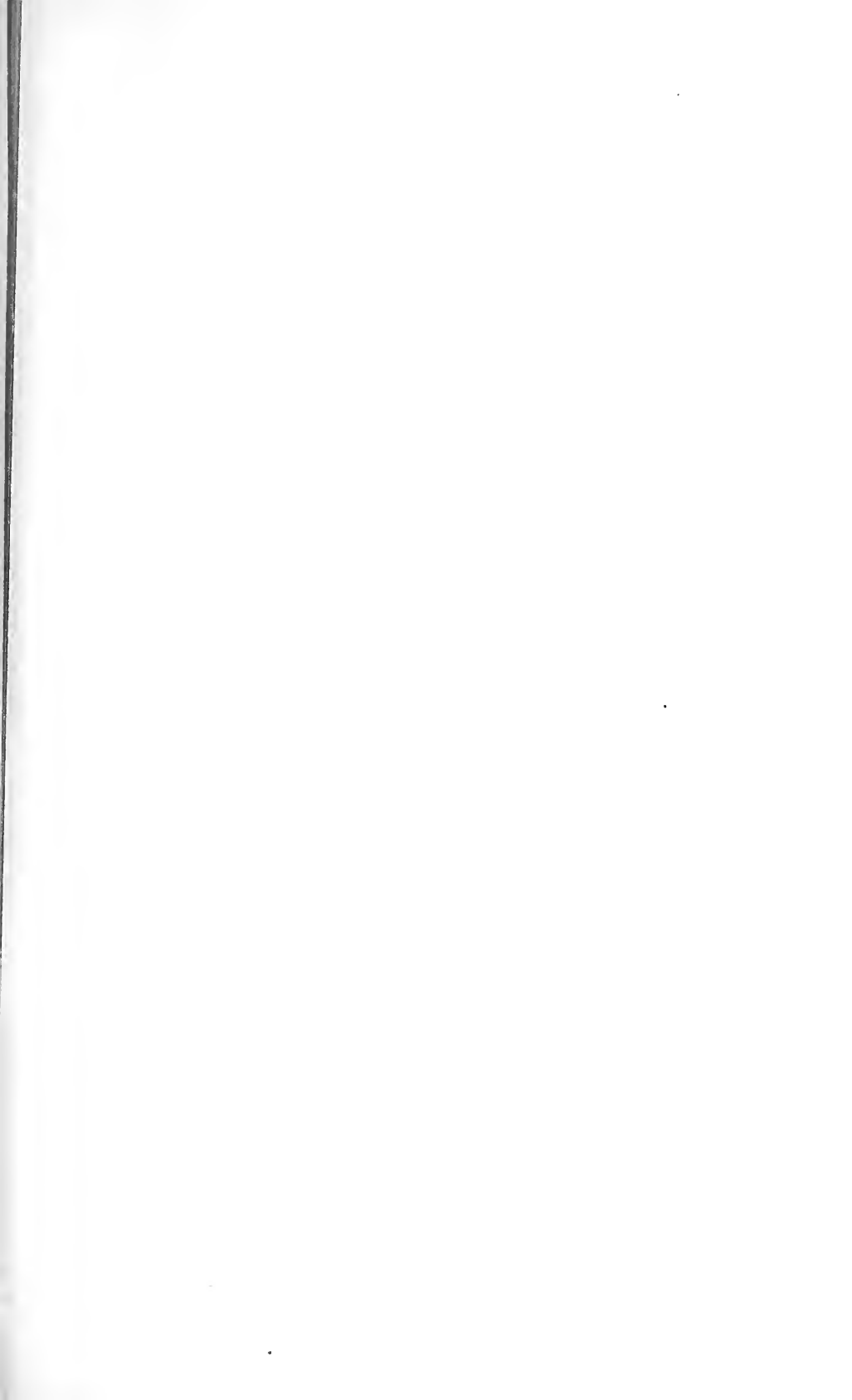
When therefore this type of efflorescence is not present the case is not one of impetigo herpetiformis, even though all other symptoms be identical.

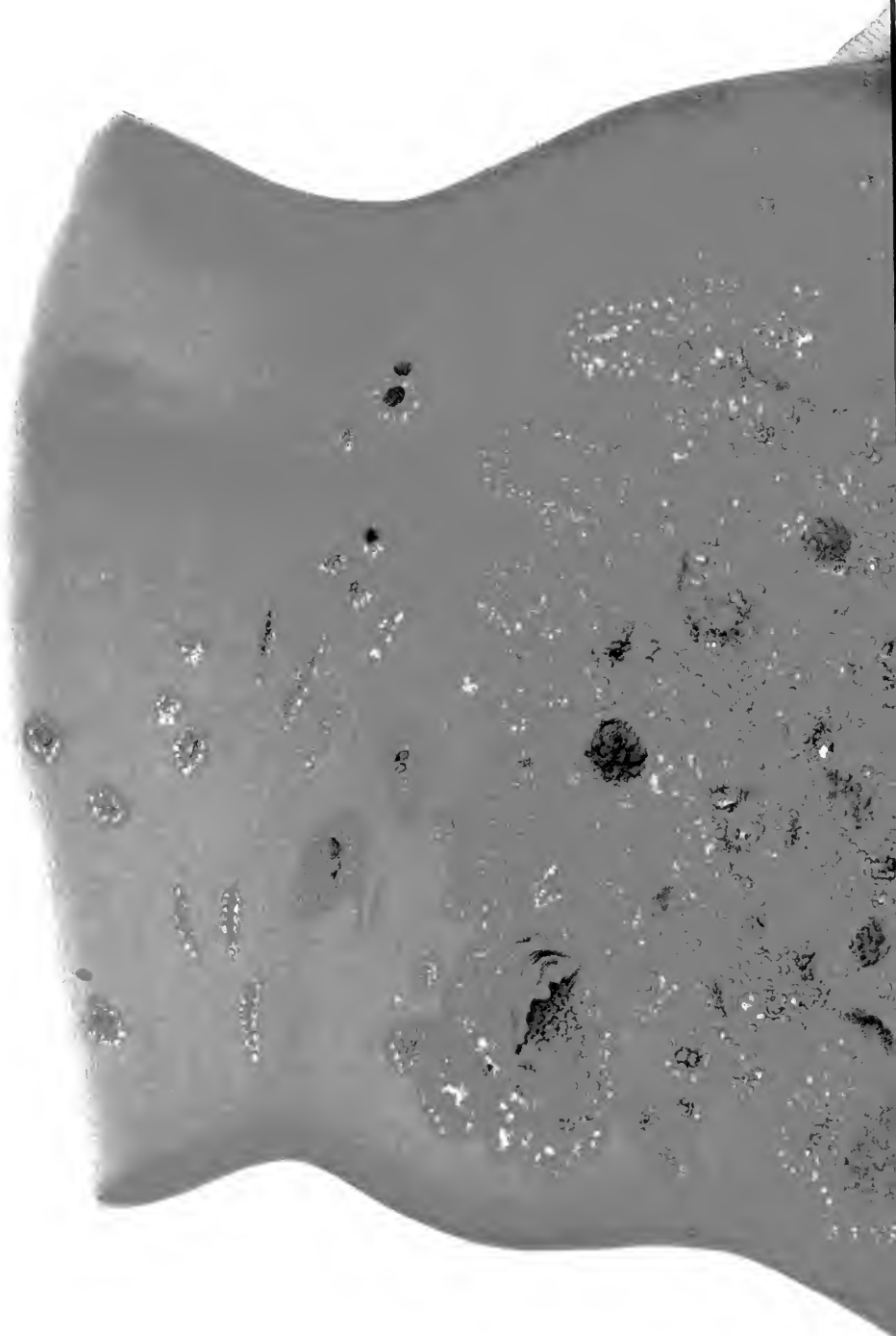
What these other symptoms are Kaposi tells us. They are localization, extension of the disease, involvement of the mucous surfaces, fever, chills, coincidence with pregnancy and the puerperal state, acute or subacute course and fatal termination. All these may be present and yet no impetigo herpetiformis, without the continuous purulent character of the lesions; in fact without also the presence of miliary pustules, and these in groups and aggregations. In the progress of the disease the centre of a group tends to heal without scarring, while the disease spreads on the periphery. The colored plates (I and II) give the character of the disease as described by Kaposi, and also indicate some of its favorite localities which are the genito-crural region, mammæ, and mucous membrane of the mouth. In some cases other localities may be affected.

Fourteen cases have come under Kaposi's observation. Of these, thirteen were women. All so far as known died in the course of the original attack or in the course of a relapse or subsequent attack, which in some cases occurred in a following parturition.

Post-mortem examinations failed to show anything like septicaemia excepting in two cases. Examination of the contents of the pustules has usually failed to show bacterial infection of a specific character.

Kaposi is inclined to return to the opinion suggested in Hebra's original communication of 1872, that impetigo herpeti-



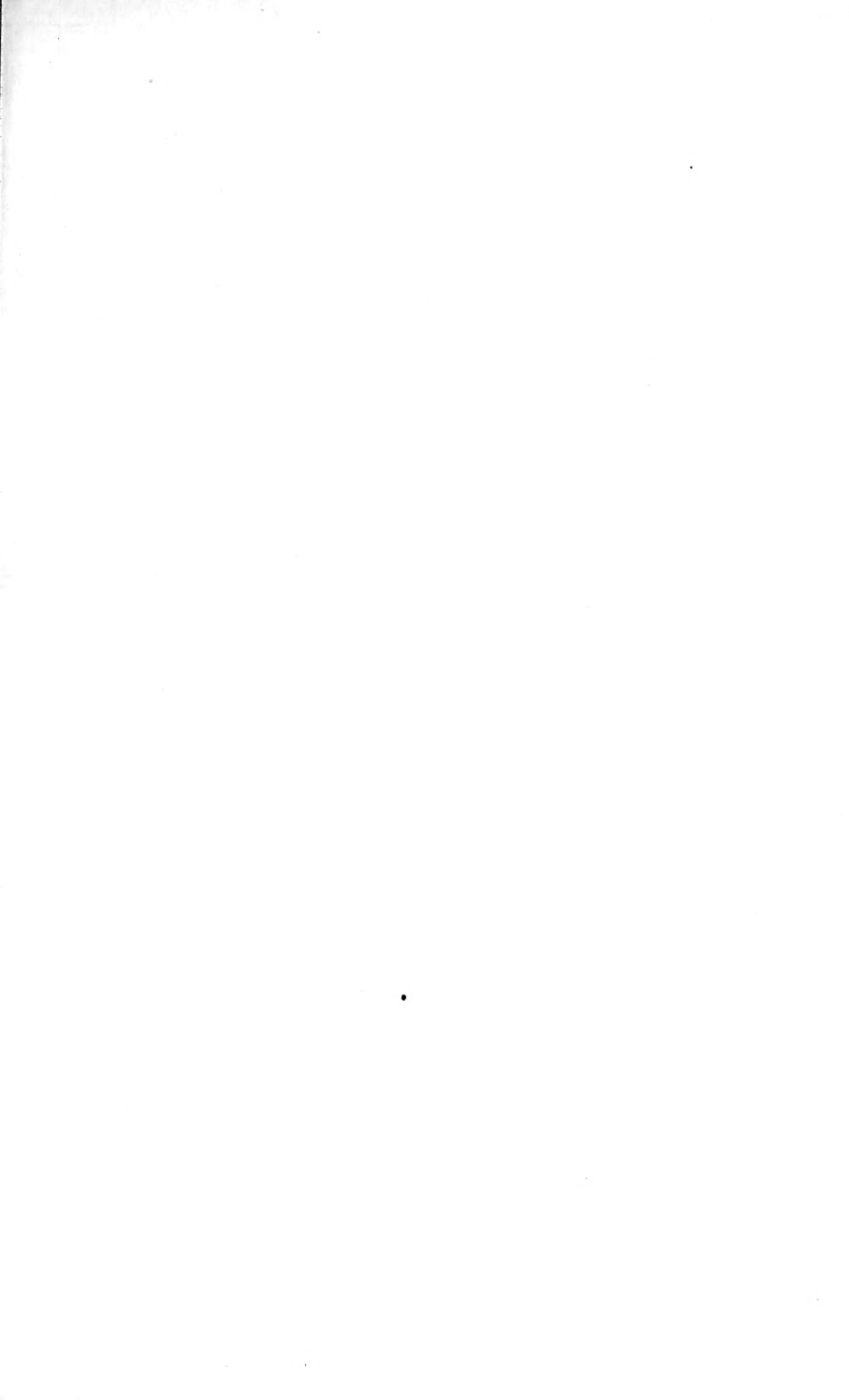




Impetigo Herpetiformis.

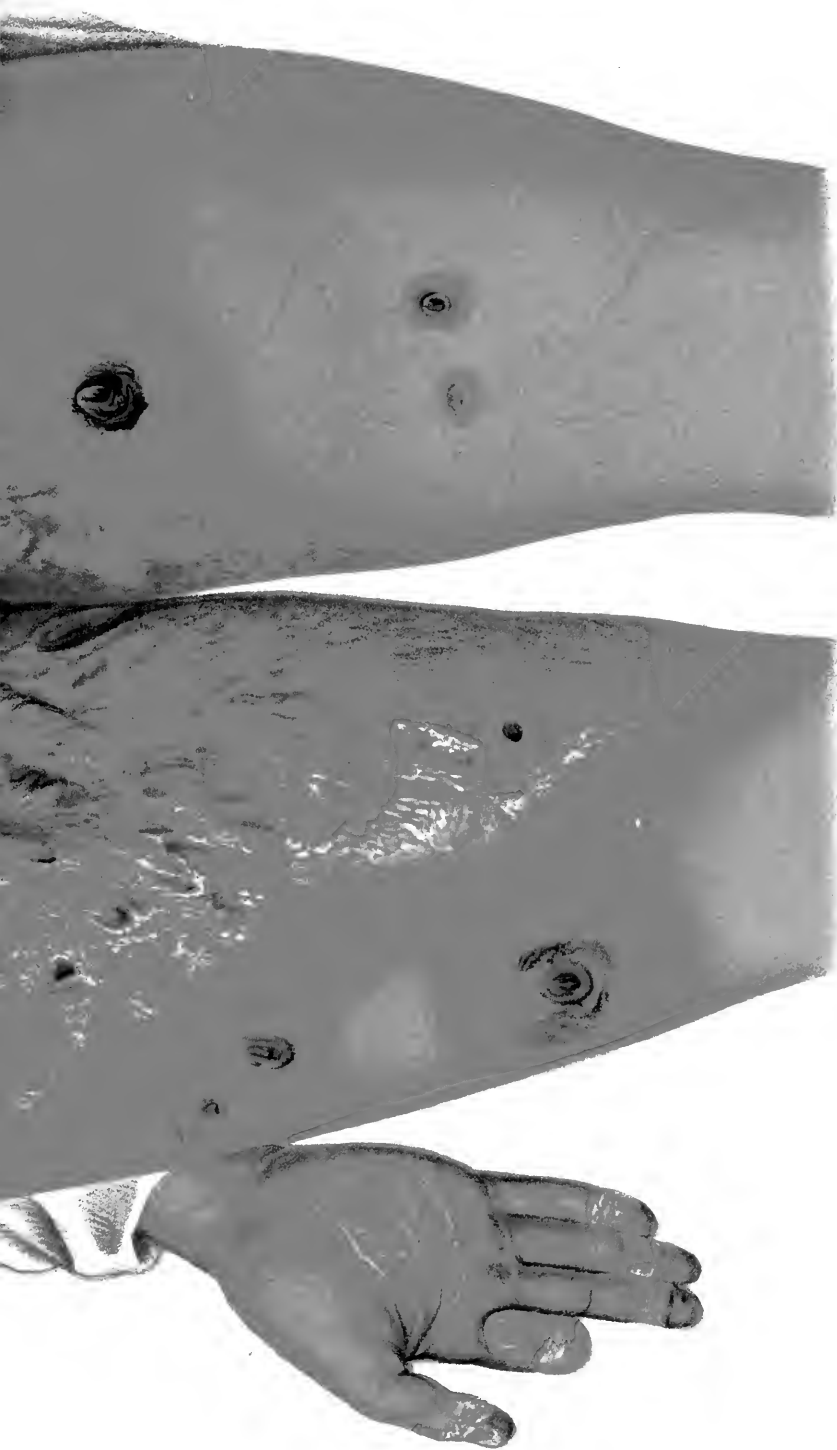
Impetigo herpetiformis is a severe form of impetigo, characterized by the presence of numerous small, dark, raised lesions on the skin. It is often associated with a systemic reaction, and the lesions may be accompanied by fever, malaise, and other symptoms. The condition is most commonly seen in pregnant women, and it is thought to be caused by a bacterial infection. The lesions are typically found on the trunk and limbs, and they may spread to other parts of the body. The condition is usually treated with antibiotics, and the prognosis is generally good, although it can be a serious condition if left untreated.



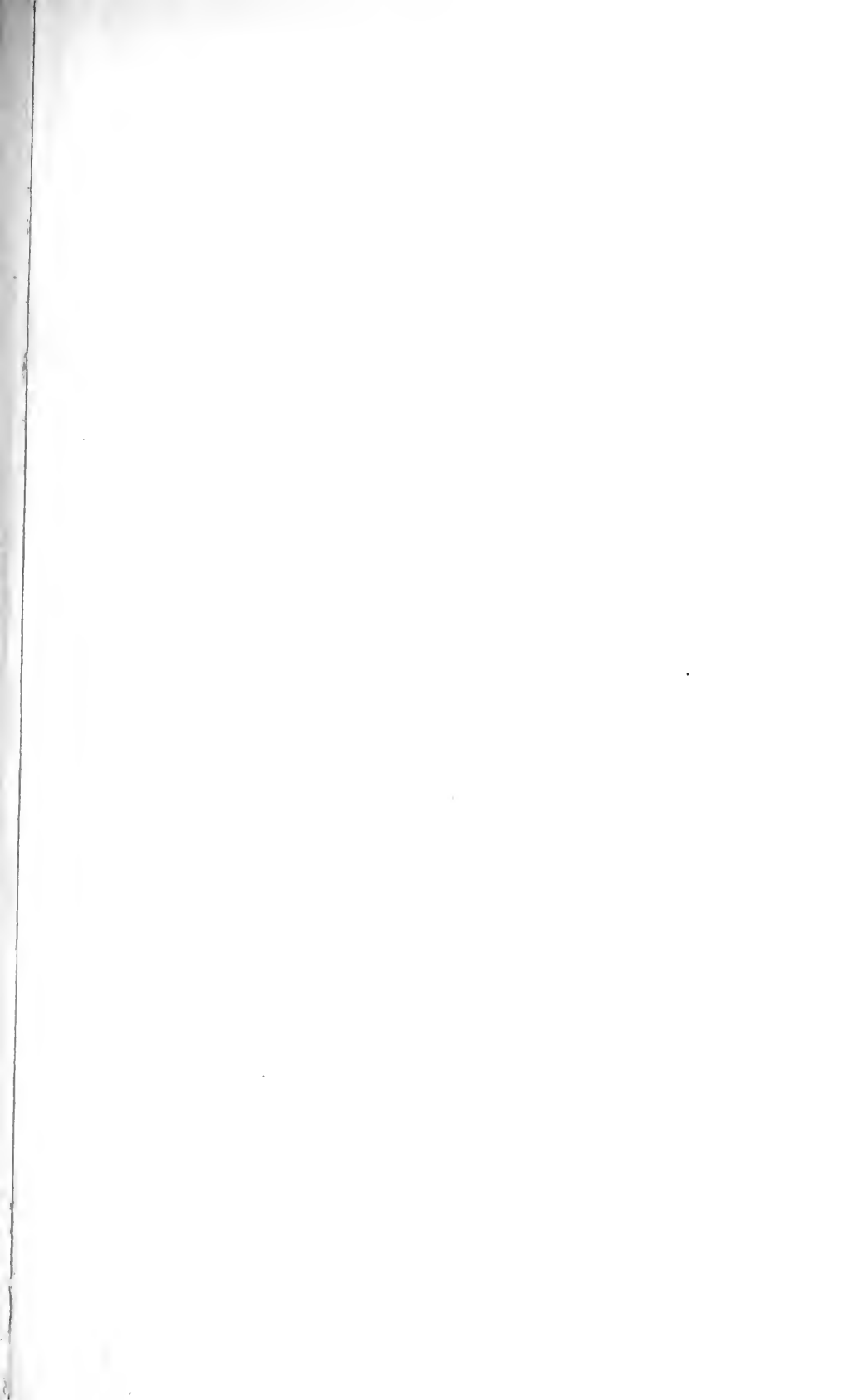


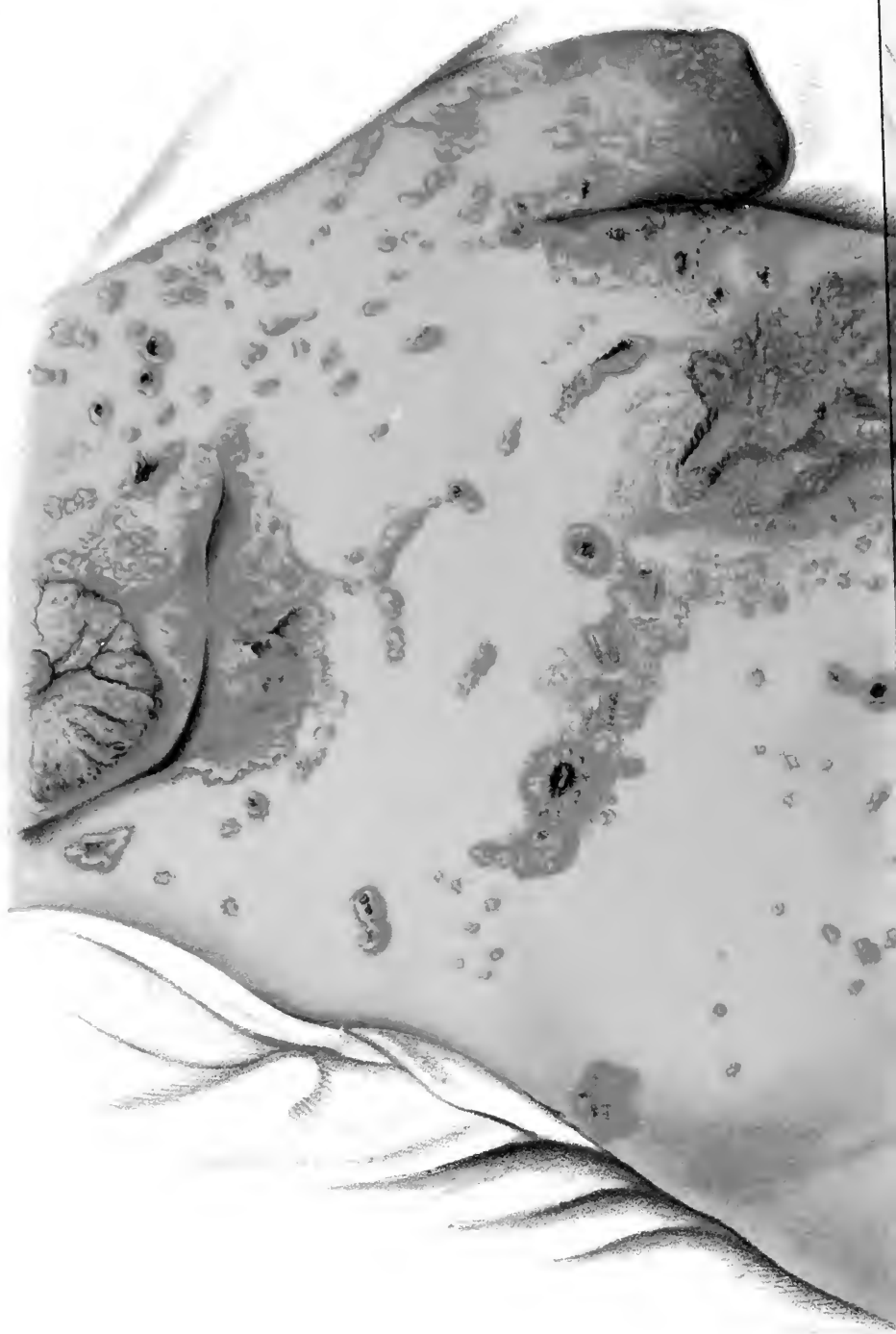


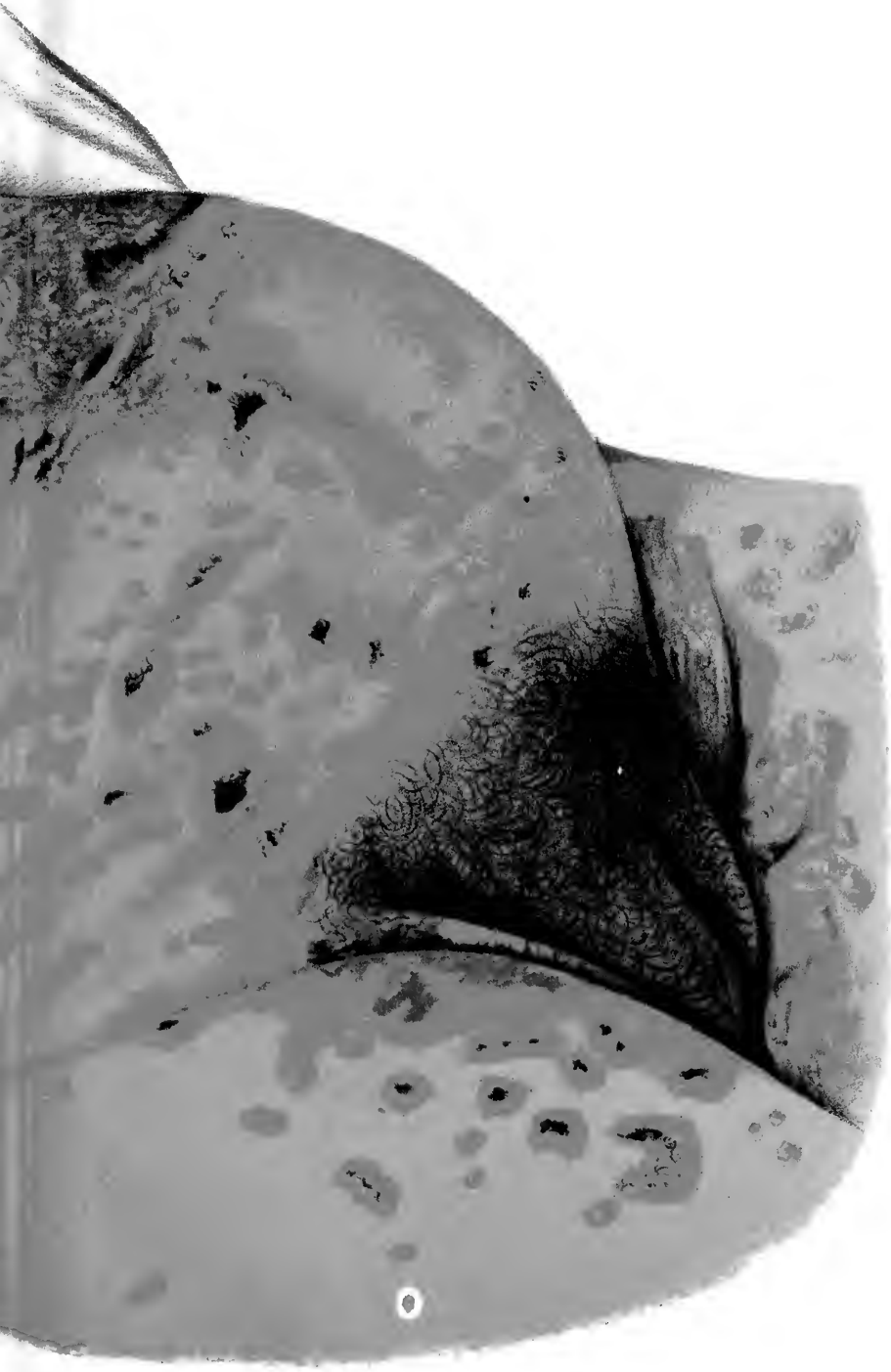
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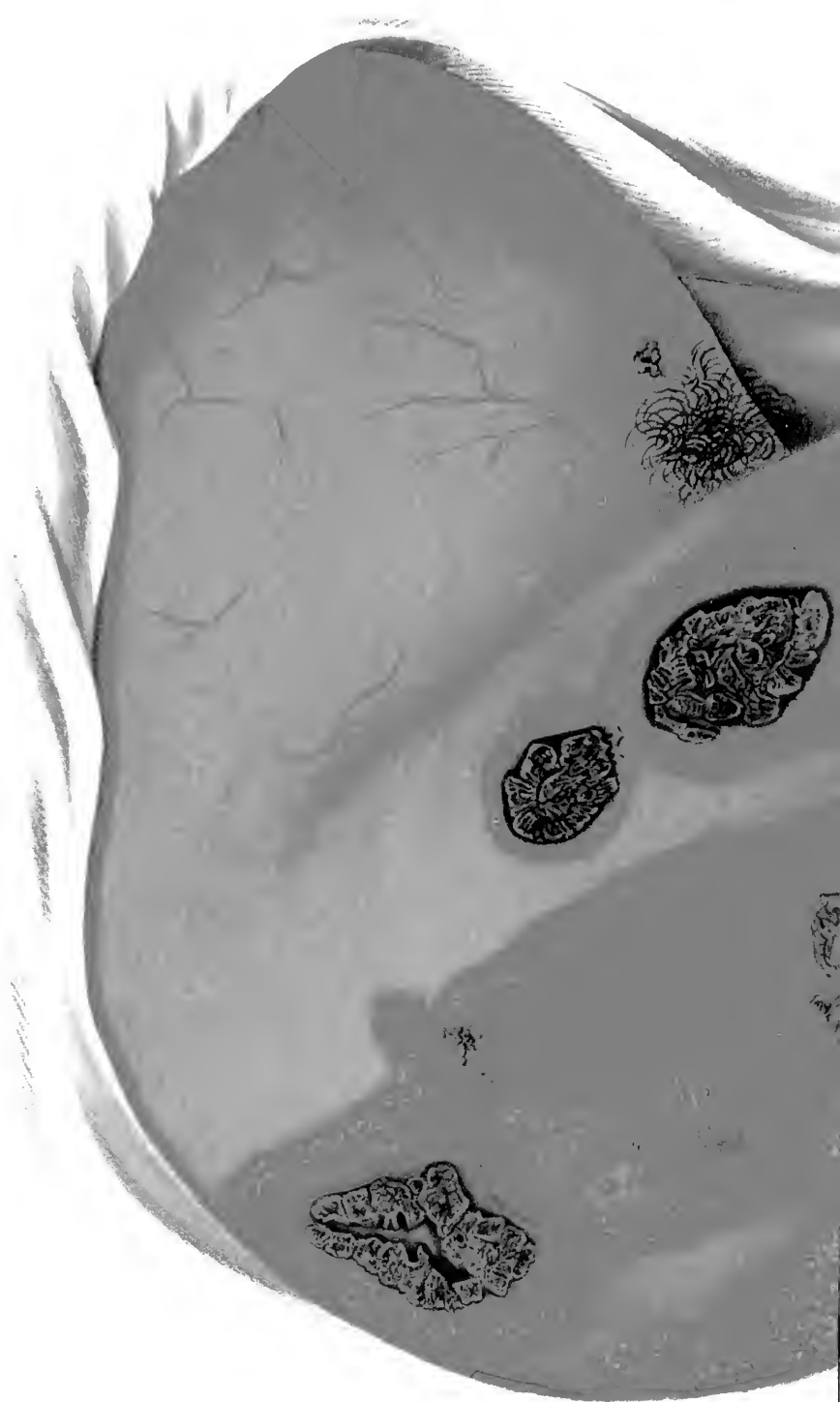








Impatiens Herpetiformis, Kap. 10.
Friedrichs, *Beiträge zur Kenntnis der Dipsacaceen*, 1. Teil, 1871.
Wilhelm Engelmann, Publisher, Vienna, Austria.





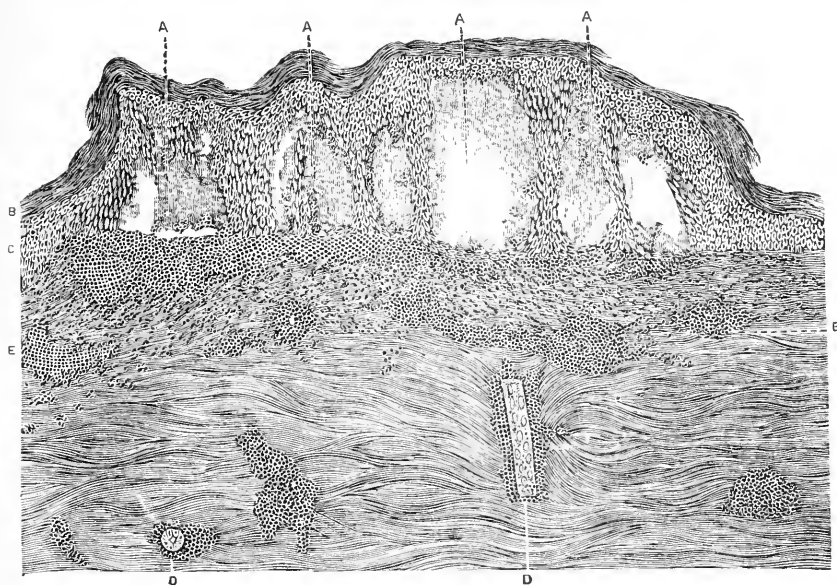


Oesophagus.

From a case of Impetigo Herpetiformis. Dr. J. C. Wilson.

Copied from Vierteljahrsschrift für Dermatologie und Syphilis, 1888, 18.
Wilhelm Braumüller, Publisher Vienna, Austria.

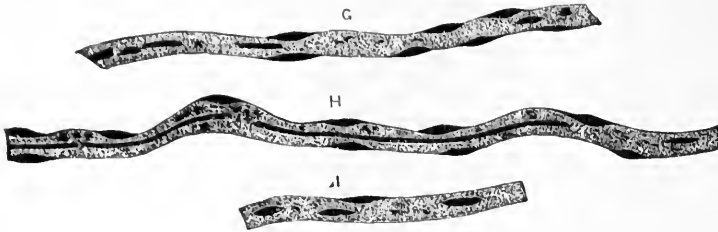
formis is an expression of some reflex nervous and vaso-motor disturbance, and is related in this sense to chloasma, urticaria and pemphigus (herpes) gestationis of pregnant puerperal and uterine cases. In fact, erythema and urticaria are found at times accompanying impetigo herpetiformis. Kaposi gives notes and colored plates illustrative of a case occurring in the male and completes his valuable if not perfectly convincing paper, by reasserting the right of impetigo herpetiformis to a separate existence.



1.—VERTICAL SECTION THROUGH A VESICLE OF HYDROA HERPETIFORMIS.—B, Epidermis. C, Rete Malpighi. A, Several loculi of vesicle. Between each loculus are columns of rete, the cells of which are, some normal, others more or less degenerated. E, Blood vessels. D, Duct of sweat gland.—(*New York Med. Journal.*)

Elliott²⁴ in a brief résumé of the opinions of prominent dermatologists on the subject of hydroa aims at the retention of this term and adds the history of a personal case with exhaustive histological examination of some of the lesions. The case resembles so closely those grouped by Duhring under the designation “dermatitis herpetiformis” that we think it well to note it in this connection. Passing over the clinical features of the eruption, we find the microscopic appearance of the excised lesions showing, so far as the corium and blood-vessels were concerned, only those features found in inflammation in general. Turning to the vesi-

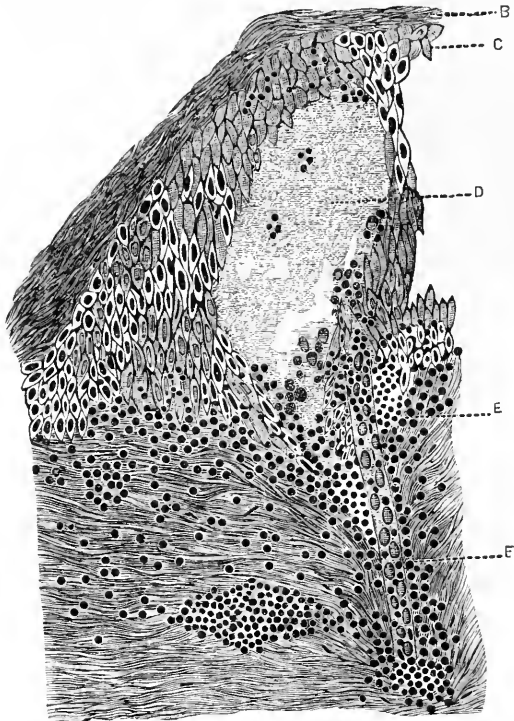
cular lesions, the connection of the sweat ducts and glands with them, and the relations which the changes in the nerves bear to



2.—THREE NERVE-FIBRES SITUATED IN PAPILLARY LAYER OF CORIUM AND ENLARGED.—(*New York Med. Journal.*)

these, we find Elliott drawing the following conclusions from his examinations (detailed at length in the original):—

In herpetiform hydraea we have an affection which owes its origin to a degenerative process situated in the nerves supplying the affected skin, and therefore probably tropho-neurotic in its nature. As a result, more or less grouped vesicles and small bullæ are found which are directly connected with the sweat ducts, and through them with the sweat glands. The point of origin of these lesions is primarily in the epithelium of the sweat ducts just below the horny layer of the epidermis, extending from there to



DUCT OF SWEAT-GLAND OPENING INTO CAVITY OF VESICLE. Only one loculus of vesicle shown.—(*N. Y. Med. Jour.*)

the cells of the rete Malpighi. The accompanying symptoms of inflammation are secondary and are situated especially in the papillary layer of the corium.

The histogenetic and pathogenetic characteristics are sufficiently distinctive to entitle it to be considered as a disease which is separate from all others.

STASIS DERMATOSES.

PERSISTENT ŒDEMA.—This curious affection which resembles and is very likely to be mistaken for myxœdema, has, during the last year, attracted considerable attention and discussion. Lassar presented two cases before the Berlin Medical Society,²⁵ the second of which is represented in our illustration. The first case was that of a young girl of seventeen, pale from repeated hæmorrhages connected with nasal disease, but not cachectic. For four years frequently repeated attacks of swelling and redness had been observed in the face. After the first year the inflammatory swelling disappeared after each attack, but the œdematous condition persisted and indeed continued up to the time of report, though improved by the long-continued use of the constant current. After the employment of the electrical treatment the attacks became less frequent, intervals of a month sometimes intervening.

Lassar remarks regarding this case, that although it can hardly be doubted that the facial œdema in this case resulted from previous erysipelatoid attacks, and that these were followed by chronic phlegmasia alba, yet on the other hand it must be remembered that cases of myxœdema are sometimes preceded by afebrile attacks of so-called erysipelas of the face. In this connection it may be mentioned that experiment has shown a reflex nexus between swelling of the nasal mucous membrane and that of the face. Such cases are differentiated from erysipelas by the absence of fever and general symptoms. These attacks can only be regarded as progressive inflammations, as lymphatic transudations of a collateral nature. These are usually rapidly reabsorbed, but if the attacks recur with frequency the resorption apparatus seems to suspend its activity and persistent œdema is the result. In this connection the statement of Bourneville and Bricon that myxœdema is not unfrequently accompanied by erysipelas, is open to objection. More likely some cases reported as myxœdema are really only persistent œdema. The group of symptoms characteristic of myxœdema are, general cachexia, myxæmia, profound nervous disturbance, feebleness. These must be borne in mind in order that a

clear, firm clinical picture may be obtained and associated with the term.

Lassar's second case (see cut) was that of a man who, so far back as 1870, suffered from a pruriginous eruption about the commissure of the lips, followed by swelling and fever of the face, which lasted some ten days and recurred repeatedly with four to six weeks interval to the present time. The attacks usually began in the lower lids, and left behind each time a residuum of indura-



LASSAR'S CASE OF PERSISTENT OEDEMA.—(*Berliner Klin. Wochens.*)

tion in the tissues, until at the time of examination the patient's face had assumed the grotesque mash-like appearance represented in the picture. When first examined the patient's visage was shapelessly puffed out, quite round like a cannon ball, and besides the deformity he suffered from intolerable mechanical discomfort. The surface of the skin was covered with a fine network of varicose veins.

The treatment followed consisted of a long-continued series of punctiform scarifications extending over the entire surface.

This was followed by marked improvement in the form of diminution in the enlargement and less frequent and violent attacks, but the œdematous condition still continued. In spite of the patient's almost imbecile expression his intelligence was and remained good. This is not, as is sometimes thought, a proof of the absence of myxœdema. Erb's case preserved intelligence intact.

ELEPHANTIASIS ARABUM.—*Histology*.—In the examination of a case of elephantiasis of the external genitals in a negress by Moseley and Morrison²⁶ the horny layer of the epidermis was found unchanged. When in the papillæ the lymph vessels had become so much dilated as to occupy the entire papilla and lower layer of epidermis, the horny layer stretched across the space forming its upper boundary. In the rete, the epidermic cells, especially those of the lowest layer which joins the connective tissue of the corium, were larger than normal; they were swollen, their outer membrane more than usually distinct, and their nucleus or nuclei also enlarged, while the nucleolus was small and pushed apparently to one side in the nucleus. The peculiar arrangement of pigment in this layer, which is to be described later on, was its most striking feature.

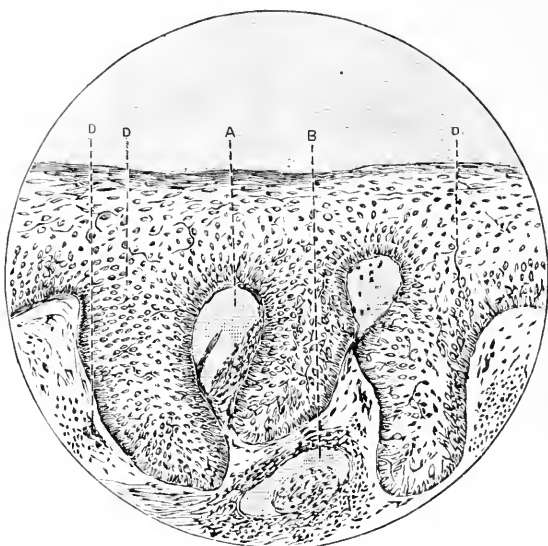
The papillæ were abnormally irregular in length and breadth. Here and there owing to the dilatation of the lymph-vessels they were entirely absorbed, and a thin layer of epidermis was all that held their portion of the skin intact. In many places when the vessels of the papillæ were visible, the lymph vessels were dilated and their contour uneven. No hair follicles were found in any of the sections examined. The sweat glands were the seat of a well-defined round cell infiltration and their blood-vessels were enlarged but their usual glandular appearance was not obliterated or altered. The vessels of the corium were somewhat dilated, and were surrounded with round celled infiltration which, however, affected more intensely the lymph vessels. The latter were dilated uneven in outline, or completely filled with lymphoid cells. Their endothelial lining was thickened, and in the tissues around them there was an infiltration of lymphoid cells. The thickening of the endothelium in the smaller lymph vessels was sufficient to render them impassable. All through the connective tissue of the corium, small and large dilatations of the lymph vessels were seen. Many of these were lined with endothelium and filled with fibrin. The

endothelium was thickened and the nuclei could be beautifully stained, while here and there it was torn away from the surrounding tissue, and lay with one free end within the space itself. See A and B in the cut.

The connective tissue fibres were thickened, the smooth muscular fibres of the skin were enlarged and increased in number. The nerves, so far as an examination of them was possible, seemed to be unchanged.

Allusion has been made above to the remarkable arrangement of pigment seen in this specimen. In the corium, underneath the line of the papillae a comparatively large quantity of pigment granules was visible.

The pigment was collected together in small heaps within round and branching cells, and also apparently scattered about in fine granules without them. In the epidermis, besides the ordinary collection of pigment in the lower layers of the rete Malpighi, it was seen to run upward from these layers in chains of very fine granules so that it



ELEPHANTIASIS ARABUM.—(*Phila. Med. News.*)

made a network of dark lines, which surrounded the epidermic cells as far up as the horny layer. It gave the sections the appearance of having been stained with gold. (See D.)

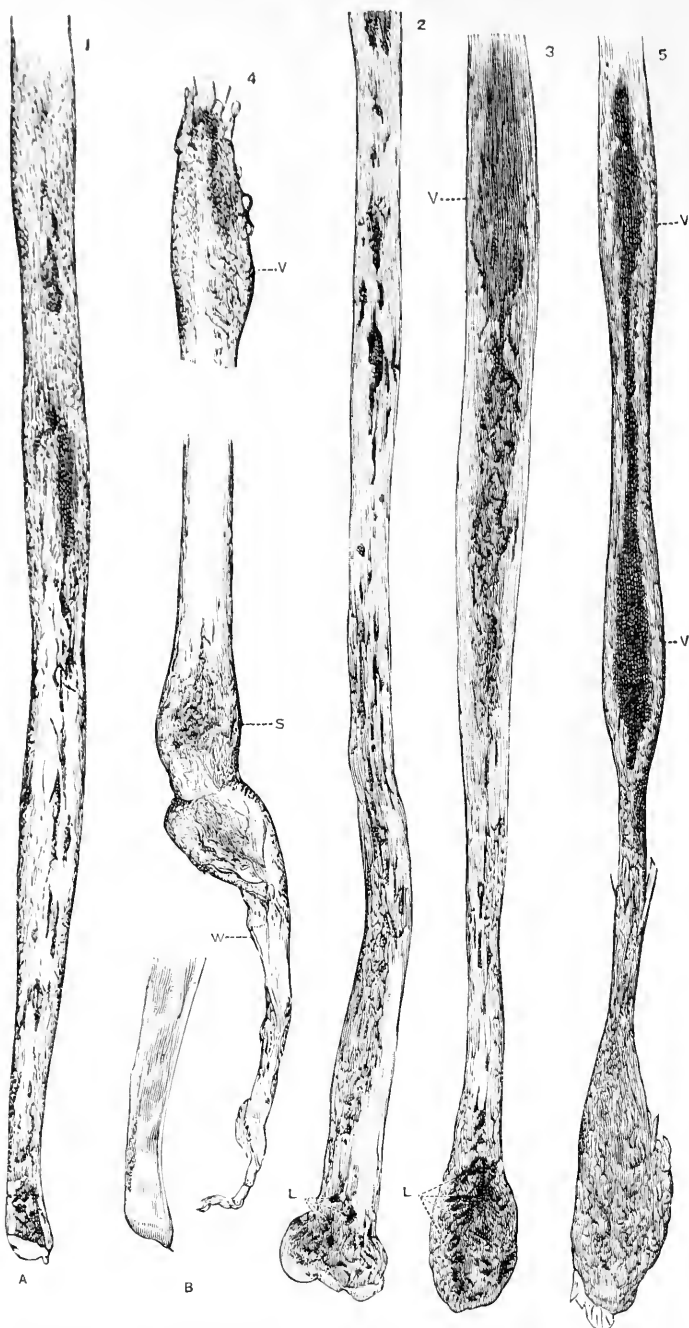
This unusual appearance is perhaps explained by the experiments of Key, Retzius and Unna, who have shown that injections of the lymphatics of an œdematous skin with gold will sometimes penetrate between the epidermic cells as far as the horny layer. Unna supposes that in an œdematous skin where the lymph spaces are enlarged, the pigment if present in the lower layers, is taken up by the lymph-bodies and deposited between the cells of the epidermis.

SCLERODERMA.—Bouthier in a recent thesis analyzed by our correspondent, Dr. Doyon, maintains the nervous origin of this disease. While post-mortem examinations give a negative result as regards the involvement of the nervous system, clinical observation seems to point strongly to such involvement. Scleroderma shows a localization similar to that of well-known trophic affections (symmetrical gangrene of the extremities, hemiatrophia facialis, vitiligo, etc.). The vaso-motor disturbances which precede the full development of the disease, the modifications of cutaneous pigmentation, the ulcers which develop without apparent external cause, the suppression of the sebaceous and sweat secretion, the anomalies of nutrition of the hair, the development of pemphigoid bullæ, the occurrence of neuralgias in various regions and of anomalous joint troubles, all support the view that scleroderma is a nervous affection. In the present state of our knowledge it is impossible to point out the exact seat of the lesion or to fix it in the peripheral nerves or in the nerve centres, in the sympathetic or in the cord.

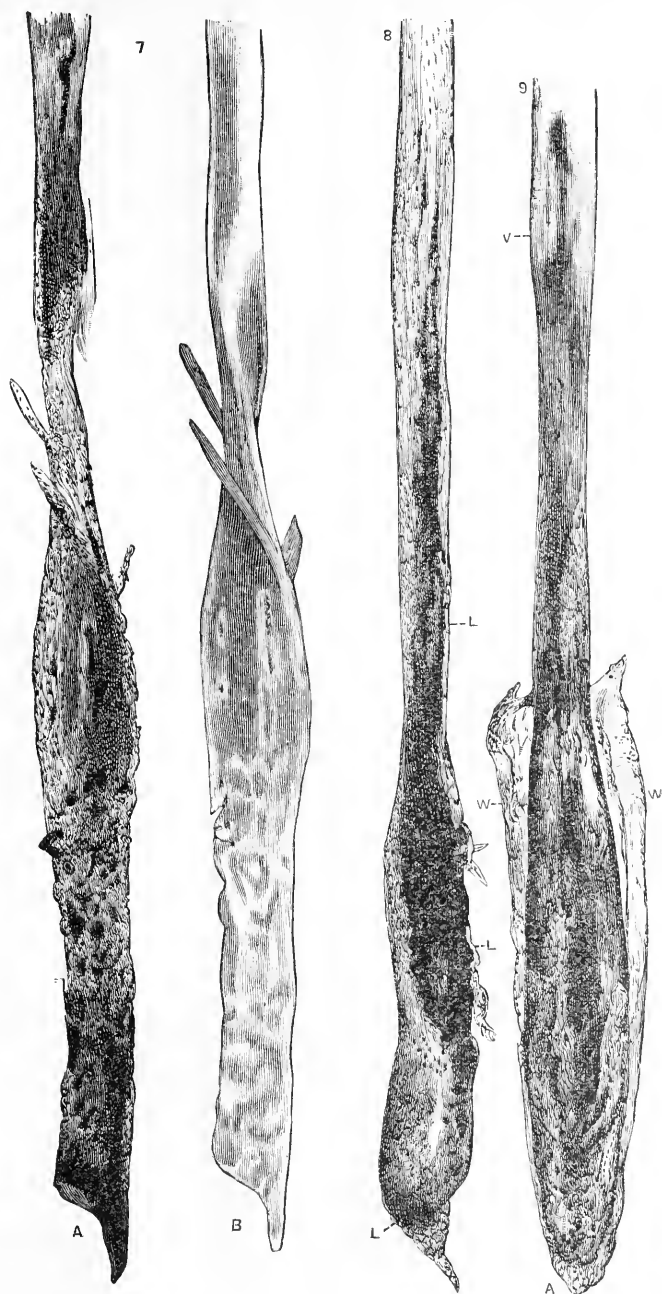
Scleroderma presents three forms:—(1) generalized, (2) sclerodactylitis, (3) scleroderma in patches. The last two may be combined in the same patient. Morphœa, contrary to the opinion of English dermatologists, should be included under the localized form of scleroderma, and its very name should disappear from dermatological nomenclature.

EPIDERMIDOSSES.

ALOPECIA.—Behrend²⁷ says that the occurrence of air within the hairs in alopecia areata and its significance has hitherto escaped the notice of investigators. It is known, although not often noted, that a redness of the skin precedes the fall of hair in a given spot in certain acutely occurring cases of alopecia, and also that short hairs are not infrequently found scattered over the bald areas as well as around their periphery. Not all of these hairs, however, which may easily be loosened and drawn out, are diseased. Some are only in a physiologically senescent state, showing a besom-like splitting, with air bubbles in their substance and surrounded by fragments of cornified root sheath. These are the clubbed or beet-hairs of German writers. These have nothing to do with the essential process of alopecia areata. But there are others which are



FIGS. 1-4.—Healthy hairs with abnormal infiltration of air into the hair shaft and accumulation of air in bulb. 1.—(1) A, by transmitted, B, by reflected light. (3) Spindle-shaped swelling of the hair at V. (4) Supra-bulbar swelling (S) with infiltration of air and swelling of shaft. FIG. 5.—Hair from alopecia with greatly enlarged and split up bulb and two spindle-shaped enlargements, V and V, on shaft. A point above the bulb shows trichorrhesis nodosa. — (Virchow's *Archiv.*)



FIGS. 7 and 8.—Hair from alopecia with short caudal process.—(7) A, by transmitted, B, by reflected light.

FIG. 9.—Same hair as Fig. 6, with spindle-shaped, air-infiltrated root, surrounded by the dried root-sheath. Seen by transmitted light.—(*Vireon's Archiv.*)

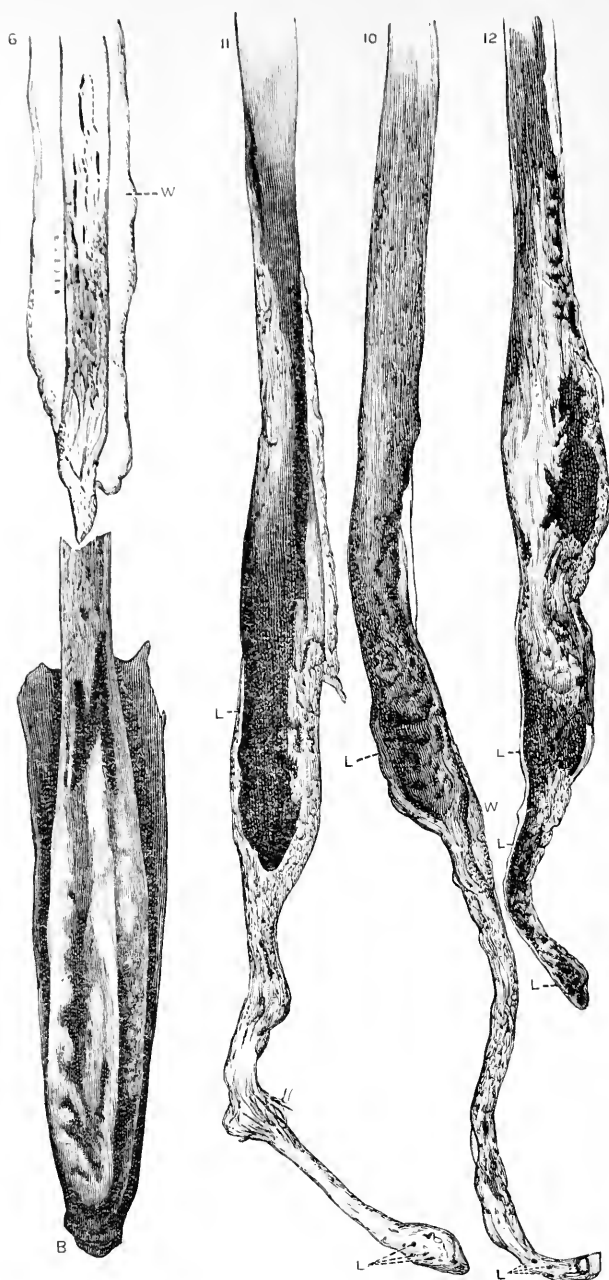


FIG. 6.—Hair from alopecia with spindle-shaped root-end surrounded by the dried up root-sheath. Seen by reflected light.

FIGS. 10, 11 and 12.—Hairs with long thread-like root-ends—the latter ending in a rudimentary bulb, which, like the shaft, is infiltrated with air (l). Figs. 10 and 11 show rudimentary root-sheaths. —(*Virchow's Archiv.*)

characteristic of alopecia areata, hairs with extraordinarily varied root termination, such as are pictured in the annexed cuts and which indicate by their diverse configuration an air-infiltration to the deepest layers as a common factor of pathological significance. These hairs are rarely found in chronic alopecia areata in the periphery of the bald spots, but are common in the acute stage of a fresh attack and may be pulled out by the bunch from the reddened areas. Even microscopically these hairs show by their narrowed and sometimes pointed roots with one or several spindle-shaped swellings further up that they are diseased.

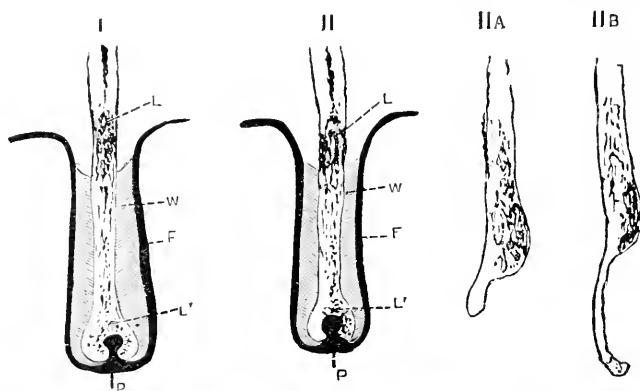
When these hairs are examined under the microscope the root-end shows a number of elongated or roundish dark spots arranged in a series in the long axis of the hair running through its substance which can be traced in a disconnected way to the spindle-shaped swelling where this exists. These spots which correspond about to the infundibulum of the hair follicle, show, corresponding to their external appearance, also in their axis, a spindle-shaped black patch often occupying the greater part of the width of the hair and looking like a spindle-shaped dilatation of the medullary canal. In many hairs, however, the dark spots are so numerous and lie so close together, that the entire mass of the hair-root is black and opaque. In such cases the edges are not smooth, but uneven, and show plainly a splitting off of their substance. Such hairs as are shown in the typical case in the plate are sometimes found in numbers.

These dark, isolated or agglomerated patches appear on closer inspection to be composed of air spaces. On removing all fatty matters and examining the hairs by reflected light (see figs. 1, 7 and 9 with 13) all these spots appear to be silvery.

The essential point with regard to these pathological changes is not so much the fact that the hair contains air, as that this is present in the root, where, under normal circumstances, air is never found, and where it can never occur without impairing or entirely destroying the vitality of the hair. It has, of course, long been known that the shaft of the hair contains air. This is derived from the atmospheric air and communicates with it. But the root portion of the hair has no such communication, being shut in by the hair follicle. If it were not, the cells of the root and bulb would dry up and the hair perish.

This is in fact the case with the hairs in alopecia arcata. In Figs. 1-4 the living and flourishing hair and well formed bulb is depicted. Just above the latter and between its elements a moderately large number of closely arranged air spaces (*l*) can be seen, and from this point up into the hair shaft larger air rifts pass. The hair in Fig. 4 is particularly interesting, as showing a second bulb-like swelling with air rifts within (*s*) above the well formed bulb. This is not an accidental circumstance among the alopecia hairs, but is often met with. Rindfleisch has remarked such swellings in alopecia.

These pathological changes alone do not cause the fall of the hair; but this depends upon whether the matrix of the hair is involved in its entire extent or only partially to the influence of



HAIR-ROOTS IN ALOPECIA AREATA.—(*Virchow's Archiv.*)

the air. This is shown in sketch I and II. If the entire matrix of the hair is saturated with air (*L L'*) its growth is suddenly arrested and the hair falls, but retains the normal or nearly normal shape of its bulb. (Figs. 1, 2, 3, 4.) If only a portion of the matrix dried up, a misshapen hair results. In Fig. II a case is sketched in which the infiltration of air (*I'*) is confined to one side of the matrix. Under such circumstances root-forms such as are sketched in Fig. IIA and IIB are the result, as well as Figs. 7, 8, 10, 11, 12. These are the hairs which show a hard, dry, more or less elongated, tail-like process upon the lower end, of a grayish white color, and which are much thinner than normal hairs. At their extremity they frequently display a knob-like enlargement, a rudimentary bulb.

It is important to observe in this connection that almost all hairs in the alopecia patches come out of their follicles, when pulled, without any root-sheath attached. Sometimes fragments of root-sheath come out with the hair, however (Figs. 10, 11); exceptionally (Figs. 6, 9) the whole sheath. In such cases, however, nothing of the normal structure of the hair-sheath can be seen. It is simply a crumpled transparent mass. Even hairs which under ordinary circumstances would be vigorous, leave their sheathes behind in the follicle when extracted, which indicates an involvement of the root-sheath in the disease process.

It is evident that the disease in alopecia arcata is a drying process. The only question is, how does the air get into the hair bulb, from above or from below. In the latter case it is probably derived from the gaseous contents of the blood-vessels.

If the entry of air into the bulb is due to evaporation of the intercellular fluid, the question naturally arises by means of what changes does this condensation occur. An exact answer to this question depends upon further microscopic research.

As a result of Behrend's researches, we are brought to the conclusion that the peculiar cause of alopecia areata lies in a disturbance of circulation. This result was reached by Michelson some years ago. The suddenly appearing circumscribed patches of redness which precede the fall of the hair in some cases seem to leave the answer to this question beyond doubt. Josephs²⁸ recent investigation on the trophic nerves seems to give additional proof.

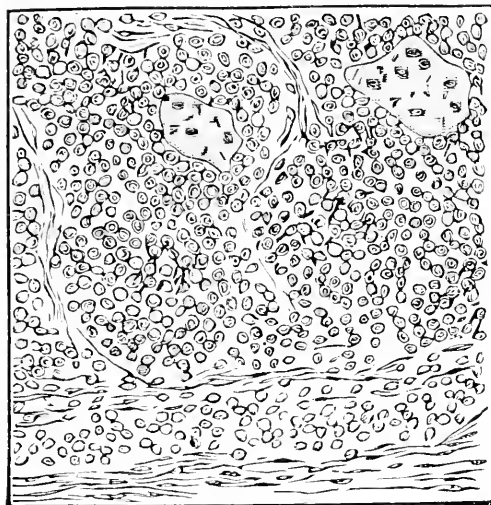
Our correspondent, Doyon, of Lyons, says that the discussion regarding the contagiousness of alopecia areata has been again revived by a communication from Ollivier based upon cases of alopecia following moral emotions together with the publications of Joseph, who has produced alopecia in animals by section of the posterior branch of the second cervical nerve. Ollivier has never observed contagion in this affection, and asserts that there is no reason whatever for isolating children who suffer from it. Gaucher agrees with him, but Brocq takes the opposite view, or at least asserts that some cases of "pelade" are contagious and others not. The general consensus of French dermatologists points the same way, according to Thibierge. The parasite of the contagious form is unknown. It is singular that in America but one

form of alopecia arcata is known, and this has never yet, I believe, been called parasitic.

CHORIOBLASTOSES.

LUPUS.—*Lupus Vulgaris and the Bacillus Tuberculosis.*—Reeves²⁹ gives an account of a case which is of interest as regards the question, are lupus and tuberculosis identical. The patient, a woman of 22, with a consumptive family history and symptoms of advanced phthisis, injured the flexor tendons of one of her fingers without breaking the skin. The finger became inflamed, presented the appearance of syphilitic dactylitis, and on examination was found to contain pus. It was lanced and a fungous condition developed around the wound. A few weeks later the finger had resumed its normal size, but was hard. There were two hard

masses to be felt and seen along the flexor sheath in the palm of the hand. A portion of the fungous mass was removed for microscopic examination. The wound soon healed, but the patient died of phthisis within a few weeks. Microscopic examination of specimens from the fungous mass were found invariably to present typical giant cells of tuberculosis and countless numbers of tubercle



(Phila. Med. News.)

bacilli. The accompanying cut shows the microscopic appearance of one of the sections.

The weak point in Dr. Reeves' case as reported appears to be the want of convincing evidence that the lesion of the finger was lupus. The history of the injury and subsequent rapid development is against the diagnosis of lupus vulgaris.

Dr. Reeves goes on to give an account of a typical case of lupus of the ear under the care of Rohé. Microscopic sections of the diseased tissue in this case showed precisely the same neoplastic cellular structure as in the first case, but with fewer tubercle

bacilli. The subsequent history of the case under Rohé's care showed the development of croupous pneumonia followed by a cavity in the left pulmonary apex.

The *British Medical Journal*, in a leading article on recent researches on lupus and tuberculosis of the skin, describes at some length Schwimmer's views on the subject which are opposed on clinical grounds to the view of their identity, although he does not attempt to explain their respective relations to the tubercle bacillus, which is common to both.

Schwimmer regards the opinions of Doutrepeont, Besnier and Leloir, who consider that lupus patients are destined to fall victims to tuberculosis of the lungs, as not borne out by facts. The grounds on which he separates tuberculosis of the skin from lupus are: First, the comparatively great rarity of tuberculosis of the skin, the relative frequency of lupus, and the difference in the development of the two processes. In ninety cases of lupus under his care he saw only five of tuberculosis of the skin. Again, tuberculosis begins almost exclusively on the mucous membranes, and from them encroaches upon the skin. In lupus the case is almost always the reverse. As regards the different effects of lupus and tubercular affections of the skin on the general health, Schwimmer says that of ninety cases of lupus, many of them severe, he found sixty-two cases in which the patients were perfectly healthy individuals and free from tubercular disease, acquired or hereditary.

It seems likely that tubercle bacilli may remain for many years localized in the organism, as in lupus, without leading to general tuberculosis. Very different is it in tuberculosis of the skin, which is usually the manifestation of a previously existing constitutional affection, although it may be the first sign of that affection. It should be remembered that bacilli are much more rare in lupus than in tuberculosis. The mere presence of bacilli alone is not sufficient to establish the identity of the process. The analogy in form between leprosy and tubercle bacilli must be remembered, and also the resemblance between tubercle, lepra and syphilis bacilli, although these three diseases are quite distinct. Cornil and Babes state that the bacilli of smegma may be confounded with those of tuberculosis. In view of these facts, Schwimmer feels justified in asking whether the resemblance of the bacilli in lupus and tuberculosis necessarily establishes their

identity. While it is true that inoculation in animals of lupus tissue produces tuberculosis, these inoculations have never produced lupus. Of course the influence of soil must not be forgotten, and it is quite conceivable that tubercle bacilli in the skin of certain individuals may succeed in producing the distinctive process known as lupus vulgaris, while in the tissues of animals they may lead to the rapid degenerative changes which we know under the name of tuberculosis. A practical point to be remembered is that caustics and surgical treatment, which benefit the lupus patient, do not usually assist the subject of tuberculous ulcers, which are commonly made much worse by such treatment. The opinions of other observers are at variance, however, with those of Schwimmer for the most part, and the general tendency of scientific opinion is certainly in favor of the essential identity of the two processes.

Lupus Vulgaris and Carcinoma.—Bayha³⁰ brings together forty-two cases, five of which are personal. Eleven of these were cases where carcinoma developed in the scars of lupus, which of course is in no way peculiar. Thirty-one cases of carcinoma developed from well-marked lupus. Investigation into the histology of the new growth showed enlargements from the interpapillary epithelial ingrowths into the lupus as the starting-point of the cancer. All transitions from the atypical epithelial growths to the perfectly developed epithelial cancer could be observed. Carcinoma developed from lupus seems to show a peculiar malignancy.

The Treatment of Lupus Vulgaris.—We have already given some account (SATELLITE, Nov., 1887) of the more recent advances in the treatment of lupus. We now add from a recent lecture by Kaposi³¹ the methods preferred by this distinguished dermatologist. Kaposi is not in favor of plastic operations, as the disease is apt to involve the repaired tissue. Nitrate of silver stick is still his favorite application. With this the diseased tissues can be bored and dug out, and there is not so much danger of involving the neighboring structures indiscriminately. When the nodules are deeply seated, solution of caustic potassa may first be used to destroy the epidermis, and then the nitrate of silver can be used to better advantage.

The following modification of Landolfi's paste is a favorite formula of Kaposi:—R Zinc. chlorid., antimonii chlorid., āā ptes. x; pulv. rad. iris Florentin., ptes. v; acid. hydrochlor. pur., ptes. v.—M.

The chloride of zinc and hydrochloric acid are put into a mortar, the chloride of antimony is then added, then the powdered orris and the whole is rubbed into a thick paste. This is spread upon linen. It dries very quickly and the plaster thus made is cut into long narrow strips not more than $\frac{1}{6}$ to $\frac{1}{2}$ inch in width. The chloride of antimony penetrates healthy as well as diseased skin, but does not diffuse itself. For this reason, it has an advantage over the Vienna paste (which Kaposi also uses at times) and is very often used in lupus serpiginosus of the extremities, but not of the face. The narrow strips are laid on covered over with lint and allowed to remain on for twenty-four hours. By the end of six or eight hours patients suffer a good deal of pain, but this diminishes later. When in twenty-four hours' time the strips are removed a yellowish greenish slough is seen. This is cast off, the raw surfaces which come into view in a day or two are rather long but narrow, the opposite edges of the epidermis are very near each other, the wound heals beautifully and quickly. A wound one-third of an inch in width requires about ten to fourteen days to cicatrize.

Arsenic paste made according to Hebra's formula acts well. It has the advantage of only destroying the diseased tissues; so that one does not have to exercise so much care in its application. On account of the great pain to which the use of arsenical paste gives rise, Kaposi has tried the paste used by dentists in painful carious teeth,—a mixture of equal parts arsenic, creosote and opium. However, after a fatal case resulting from arsenical absorption he employs this no more. Kaposi also employs a 10 per cent. ointment of pyrogallie acid. To flatten scars he employs a solution consisting of 5 parts each of iodine and iodide of potassium and 10 parts glycerine. An excellent means of destroying lupus is the thermocautery of Paquelin, which is also the case with the galvanocautery. Kaposi's other remedies are the same as those usually in use everywhere. Wichmann, we are informed by our correspondent, Ecklund, covers the lupus ulcers with absorbent cotton soaked moderately in pure lactic acid, and over the cotton is placed oiled silk, and then a bandage. If the surrounding tissue be quite normal it is protected by grease or collodion; otherwise the acid produces blisters. Dr. Fowler, of Youngstown, Ohio, recommends the use of a saturated solution of muriate of cocaine applied locally. He says it has a selective influence upon devitalized tissues similar

to that of arsenic, but without the objectionable qualities of the latter.

Influence of Erysipelas on Lupus.—Our correspondent, Dr. Bayer, of Prague, reports that Winternitz has published three cases of lupus where erysipelas occurred as a complication. The temporary improvement following the erysipelatous attack soon ceased; and in two cases the lupus grew worse, probably, as Winternitz thinks, because the infiltration left by the erysipelas offered a favorable soil for the propagation of the lupus.

TUBERCULOSIS OF THE SKIN, says our correspondent, Dr. Doyon, occurs in four forms,—lupus, scrofulo-tuberculous gummata, verrucous tuberculosis of the skin of Ruhl, and tuberculous ulcers of the skin, properly so called. Vallas, in a recent Lyons thesis, has studied the latter forms characterized by the development of an irregularly shaped roundish ulcer, with a grayish-red granular base with sharply-cut edges and small yellowish and grayish projections which are minute tuberculous granulations. These ulcers are usually situated about the natural orifices,—mouth, anus, etc; more rarely the fingers and the hand or the face; more rarely still the genitalia and lower extremities. They only attack persons already suffering from visceral tuberculosis and who have arrived at the cachectic period of the disease. Anatomically, two forms are distinguished: (1) The granulo-caseous when the granulations formed entirely of embryonal cells occupying the derma are connected by an almost continuous infiltration of embryonal cells. The caseification occurs *en masse* and invades simultaneously the granulations and the intermediary infiltration. In the deeper portions of the derma the embryonal infiltration is more diffused. (2) The follicular variety, where the lesions consist in the development of tuberculous follicles, formed of a giant cell of a narrow epithelioid zone (Köster's follicles), which are not connected together by bands of embryonal infiltration, but around which the derma is transformed into a translucent substance, the disintegration of which leads to ulceration. These lesions differ from those of lupus in that the latter present a reticulated tissue with only a moderate tendency to disintegration. In these lesions bacilli are rare, and inoculations, positive with guinea pigs, negative with rabbits, show that we have an attenuated form of tuberculosis. In Vallas' opinion the ulcers of tuberculosis of the skin do not occur from bacilli conveyed in the blood,

but from local inoculation of the bacillus tuberculosis. Their common seat about the orifices of the body through which pour the secretions containing bacilli from visceral lesions, their appearance also on the hands and fingers, which are also apt to be brought into contact with diseased fluids, is easily explained by the hypothesis of local reinfection. The cachectic condition of the patient likewise plays an important part, favoring by the general degeneration of the tissues the growth of the bacillus tuberculosis.

As to local treatment, this is of small avail: iodoform dressings are probably best. The general treatment should be tonic and supporting, directed against the cachexia.

LEPROSY.—*Its Nature and Mode of Propagation.*—Since the discovery of the bacillus of leprosy by Armauer Hansen about the year 1870, says Besnier,³² numerous investigators have corroborated his observations, and it is now certain that this bacillus, which, by the way, is in many respects nearly identical to that of tuberculosis, though easily distinguished by experts, is found in all forms and varieties of the disease.

Frequent examinations of the blood current by numerous observers have failed to show the bacillus. It is probable that when introduced into the circulation these organisms are rapidly carried to the capillary vessels and thence by diapedesis to the lymph spaces, where they set up the characteristic changes observed, *i.e.*, the formation of “lepromata.”

The lymph may contain lepra bacilli: the glandular secretions and excretions, notably the urine, on the other hand, are almost invariably quite free. But tears, nasal secretion and saliva swarm with bacilli in all cases where the ocular, nasal or bucco-pharyngeal surfaces are lepromatous, and the same is the case with the intestinal excretions in leprous diarrhœa (lepra of the large intestine and the rectum). The uterine mucus and the vaginal secretions never contain the bacillus lepræ,—a negative point of value as regards the innocuity of sexual relations with leprous women. On the other hand, in the frequent and often early involvement of the testicles in male lepers the sperm certainly contains bacilli. The pathological fluids exuding from the neighborhood of bullar “leprides,” as Besnier calls the skin lesions of leprosy, or from the surface of ulcerative or gangrenous lesions, contain bacilli in greater or less abundance. On the contrary, in the mouth, in

erythematous leprides and in tropho-neurotic lesions due to affection of the nerves, the bacilli are absent as a general thing. The vaccinal fluid certainly contains bacilli (see, however, later some contrary opinions on this subject), and the disease may be communicated by this means, so that we may speak of vaccinal leprosy as we speak of vaccinal syphilis. In the same way leprosy may almost certainly be conveyed in chancres and other venereal sores. The bacillus of leprosy may be detected in all portions of the integument, but particularly in the succulent tissues of the corium, the lymphatic network and spaces, the connective tissues of the dermic and subdermic capillaries and in the terminal nerve fibres. Except as a result of mechanical violence the upper layers of the skin are free from the bacillus, and it is therefore unlikely that the disease can be conveyed by ordinary contact. The sudoriparous and sebaceous glands and the hair follicles are also free from invasion by the bacilli. The external mucous surfaces, those of the eye, nasal and bucco-pharyngeal passages, abound in bacilli, in most cases of tegumentary and of mixed leprosy; but the visceral mucous membranes, properly so called, excepting that of the rectum and large intestine, are free, as also are the uterine and vaginal mucous membranes. The capillaries of the affected parts are surrounded or choked with embolic bacilli: they present all the alterations associated with peri- and endarteritis and with peri- and endophlebitis. The lymphatics and ganglia are the characteristic and constant foci of bacilli. In leprosy, contrary to our experience in syphilis, the central nervous system remains free from bacilli, any changes which take place at this point being secondary. In the nerve fibres beyond the plexus or in the terminal ramifications of the second order specific bacillary lesions are found. It is supposed, although our knowledge on this point is as yet vague, that the bacilli find their way along the nerves by means of the lymphatics accompanying their sheaths. With regard to the viscera, it has been proved that the bacillus of leprosy may attack these as well as the skin, nerves, etc., though not so frequently.

From the foregoing it appears that leprosy is a bacillar disease, due to a specific and peculiar bacillus which is never found without leprosy, and which in true leprosy can never be absent. The discovery and establishment of this fact which we owe to the

recent investigations of Hansen, Neisser, Cornil and Bates, Unna, Lutz, Campana, Arning, Leloir, and others marks a most important epoch in our knowledge of leprosy.

Even before the bacillar origin of leprosy was fully understood White, of Boston, called attention to the gradual spread of the disease and to the necessity of viewing it as contagious, and this able writer showed almost to a demonstration that contagion alone would account for the spread of the disease in recent times. The theories formerly advanced to account for the origin of leprosy,—malaria, a diet of decayed fish, excessive sexual intercourse, etc., fall away in the light of the recent theory of bacillar infection and are seen, like poverty, misery and filth, to be simply favoring accessories. The part played by syphilis is probably important in a double aspect, first in the cachexia produced by syphilis, which favors the occurrence of leprosy and, second in the fact that the ulcerative and other moist lesions of syphilis probably form an open door for the entrance and absorption of bacilli.

Since the discovery of the bacillus lepræ a new point has come up for discussion, namely, by what mode is the infective germ conveyed from one person to another? Now, there are two ways in which the organism may be conveyed,—either directly by contact or inoculation, or indirectly through the medium of the soil, the air, water, or some form of food. Arning alone has taken up the study of the indirect conveyance of the leprous contagion, and has examined in the Hawaiian Islands, where perhaps the most active focus of leprosy exists to-day, the various media likely to convey the bacillus, air, water, and foods, but invariably with negative results. Of course this by no means proves the absence of bacteria, but perhaps only that our knowledge of these microphytes and our methods of investigation are as yet insufficient.

When we come to examine the question of contagion in leprosy from a practical standpoint it must be remembered that there is a difference in the character of contagious diseases. In considering leprosy as a contagious affection we must rid our minds of such a notion of contagion as we attach to variola for instance, or even syphilis, where we can almost invariably trace the disease from one person to another, or, as in the latter case, can point to the primary lesion, the point of entry of the poison. Almost every unprotected individual exposed to small-pox or syphilis is in

imminent danger of contracting the disease. But in leprosy how different! Doctors, nurses, attendants, relatives and friends of lepers live in the localities where the disease is rife, in the leper asylums and hospitals, for years and decades without contracting the disease. In fact, such cases are so rare as to be notorious; and we believe it would be possible to name and locate almost every one of the distinguished martyrs to religion, philanthropy, duty or science who have thus become infected. To compare small things with great we may mention such a parasitic disease as ringworm, the spores of which are probably continually floating about in our atmosphere, particularly that of schools and asylums, without infecting any excepting certain susceptible persons, and chiefly the young. In like manner, not only climate, soil, and hygienic surroundings, but also personal susceptibility, enter very largely into the question of contagion in leprosy, and it is most likely, as far as our present knowledge goes, that a lesion of the integument is likewise necessary in order that the prepared soil may receive the germs.

In the temperate latitudes of this country no case of leprosy has we believe ever been the cause of contagion. The climate and our cleanly modes of life are very much against such an occurrence. Experience in New Brunswick, however, seems to indicate that climate alone can not prevent the spread of the disease; but that poverty, and the herding together of the sick and well may act as favoring influences to the spread of the disease, though in a slow and uncertain manner.

The objections which have been raised against the contagious character of leprosy are indeed formidable, though future experience may overthrow them. They may be grouped as follow: (1) Leprosy has never been successfully inoculated in animals. (2) Inoculations practiced upon man have likewise proved unsuccessful. (3) Persons have frequently lived and even slept and cohabited together for years, one leprous the other healthy, without the disease having been transmitted. (4) Physicians, nurses, etc., do not contract leprosy from those for whom they care. (5) Lepers who have come to large centres of population, as Paris, London, New York, and Philadelphia, have never transmitted their disease to others, nor started foci of disease.

With regard to the first of these objections, the same may be urged against syphilis. In both diseases man offers a home to the

virus which is refused by all animals hitherto experimented upon.

As to the second objection, that inoculations made on man have never proved successful, this it is urged proves nothing *ipso facto*. Inoculability is in fact only one process of contagion. Such diseases as diphtheria, cholera, typhoid fever, scarlatina do not appear to possess it. Here, too, it may again be said that the *technique* of bacteriology is not yet sufficiently well understood to enable us to assert any thing positive on this subject. And it may be added that experiments upon man can only be undertaken under rare and exceptional circumstances (condemned criminals, etc.)

It must be admitted, however, that the most recent as well as the most scientific effort to inoculate leprosy in man—that of Arning on a condemned criminal in Hawaii—has thus far practically failed. With the criminal's written permission, Arning inoculated him in September, 1884. Bacilli were found in numbers about the inoculated spot until March, 1885, after which they gradually diminished in number, but were still found in pieces of skin cut out from the inoculated part at the latest examination fourteen months from the date of implanting. Since November, 1886, nothing has been heard, so far as we know, of any development of leprosy in this case. Arning, who is said to have wounded himself at the autopsy of a leper, has not contracted the disease.

A good deal of interest has been excited during the past year by the publication of a remarkable case by Prof. Gairdner, of Edinburgh,³³ when leprosy was supposed to have been conveyed by vaccination. The history is briefly as follows: Six or seven years ago a boy was brought to him suffering from leprosy, from which he subsequently died. This boy, who was born and had lived on an island within the tropics, a well-known seat of endemic leprosy and had been vaccinated from the son of a physician there, the subject furnishing the vaccine matter, himself having been vaccinated from a child belonging to a leprous family. This last child is supposed to have had leprosy, but this fact is not known. What is known, however, is that the physician's child developed a mild form of leprosy, and was sent to England, where he lived in a large public school for a number of years. His stay there was authorized by no less authorities than Living and McCall Anderson. No evil results followed.

This case is regarded by Prof. Gairdner as conclusive of the possibility of transmitting leprosy by vaccination and Besnier so regards it. The facts certainly do seem very strongly to favor such a view, although there are certain lacunæ in the web of proof. In the first place, the person from whom the vaccine matter is taken is not *absolutely known* to have been or to have become leprosy. In the second place, the two children had been born and brought up nearly to adolescence in a region where leprosy is endemic and where they must have been exposed in a thousand ways to leprosy infection. These facts should cause hesitation in admitting the conclusiveness of the case.

Dr. Bevan Rake,³⁴ of Trinidad, who has made numerous investigations on the subject of the etiology and pathology of leprosy, notes that twenty-seven observations on material taken from vaccine vesicles or pustules in lepers tuberculated, anæsthetic, or mixed, failed to show bacilli in any of them. Arning, it should be said, examined the lymph from three vaccinated lepers and found bacilli in the lymph and crusts from a vaccine vesicle in one tuberculated case.

With regard to the third objection that two persons, one a leper, the other healthy, may have lived and cohabited for years without one having transmitted or the other received the disease, it is a true one, and so also is the contrary, as in the case of the native Irishman who had never left his native country, and yet who after sleeping with his brother, who had returned from India a leper, and wearing his clothes some time, finally contracted the disease. There is no question that a vast number of persons have lived among lepers with impunity. What is wanted to prove contagiousness is the production of a number of cases like that of the Irishman just cited. A single case will not do, for sporadic cases have arisen in non-leprosy countries; but if a number of cases can be produced, where a healthy person living in a healthy country has contracted leprosy from a leper, such a demonstration will be of the utmost practical importance. Norway, Nova Scotia and Minnesota are localities to which we may look for information of this sort. As to Nova Scotia, White, of Boston, gives evidence in favor of contagion gathered from the leper settlement at Tracadie which is striking.

The fourth objection, that physicians, nurses, attendants, etc.,

escape the disease, may be met with a denial if considered as regards the residents in leprous countries. For instance, in the Sandwich Islands nine to ten per cent. of the attendants are said to have contracted the disease. Here again the objection may be reiterated that no physician, attendant or nurse in the great cities where lepers are constantly living and being treated has ever contracted the disease. Besnier meets this objection by saying that no similar case of contagion has come under his observation in the syphilitic wards of the Hôpital St. Louis where hundreds of cases are constantly under observation and treatment. But it must be admitted by all that this is an unusual experience. Fournier in the same hospital has seen many cases of contagion among attendants, etc.

To the fifth objection, that lepers imported into the great centres of population, as Paris, etc., have never established new centres of leprosy, Besnier admits the fact, but says it is because scrupulous cleanliness, good hygiene, etc., are brought to bear to prevent contagion; and that, moreover, most of the cases having arrived at that stage when they are disgusting objects, they are generally shunned as much as possible. If, however, says Besnier, the opinion once becomes popular that leprosy is not contagious, with the constant importation of lepers which is taking place, and the promiscuous intercourse which will follow, it will not be many years before this objection will be met by a practical and ample refutation.

Finally, with regard to the hereditary transmission of leprosy. This is a matter still in dispute, or perhaps rather still incompletely investigated. Besnier believes that leprosy may be communicated by indirect conceptional channels; by which he means latent or evident material contamination by the spermatie bacillus in those cases (constant, in all probability) when the germ accompanied by this bacillus is not viable. A direct contagion by means of the sperma is unlikely, because connection at the stage of the disease when bacilli are found in the spermatie fluid is usually sterile.

A child born of leprous parents at full term and viable has a fair chance, in Besnier's opinion, of escaping the disease if removed at once from unhealthy influences and brought up in a non-leprous country.

Treatment.—Our correspondent Dr. Baelz, of Tokio, says that

Murata has treated five cases of leprosy according to Unna with ichthyol and chrysarobin. These are useless in the anæsthetic form, but reduce the tubercles in the tubercular form without arresting the disease. A discussion on this paper indicated divergence of opinion among the Japanese doctors as to contagiousness.

SYPHILITIC ACHROMATOSIS.—Under the barbarous appellation of “vitiligo acquisita syphilitica,” Poelchen³⁵ describes a case of much interest, accompanying the text with two plates, one of which we reproduce. On the pigmented skin of individuals, particularly women who have suffered from the macular syphiloderm for some weeks or months, we occasionally find whitish, indistinctly defined roundish or elliptical spots resembling the roseolar rash. The neck is most commonly affected, then the buttocks, the upper arms and the thighs; rarely the face, forearm and leg. It has been shown that these achromatoses affect chiefly the previously pigmented patches of the macular syphiloderm, and may therefore be regarded as a sequela of that eruption and therefore of diagnostic value. Neisser gave the name leukoderma syphiliticum to this eruption, but Poelchen, with the true dermatological itch for new names, calls it “vitiligo.” The eruption in Poelchen’s experience is not uncommon. The appearance of the whitish spots begins immediately upon the fading away of the macular rash. Poelchen thinks that exposure to sunlight prevents the occurrence of the achromatosis. Thin soft skins are more liable to it: hence its comparative infrequency among men. Its duration varies greatly: from forty-eight hours to as many months.

Poelchen agrees with Neisser in believing that a formative incitement for the matrix of the epidermis is found in the hyperæmia of the roseolar spots. As a result of this the affected patches desquamate more rapidly than the unirritated neighborhood, thus removing accumulated pigment in a shorter time.

The achromatosis disappears either by a gradual browning of the leukodermic patches or by a gradual loss of pigment in the surrounding skin,—at first in patches, and finally resulting in an entire freedom from pigment of the whole locality. It is not correct, according to Poelchen, to regard the pigmentation as a disease and the parts free from pigment as normal. In this respect he differs *in toto* from the observations of such French and American observers as Fournier and Taylor, denying as he does the existence



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of a pigmentary syphiloderm. The picture annexed shows a case of achromatosis ("leucoderma" or "vitiligo"), of two and a half year's standing, just beginning to disappear. The other picture accompanying the original gives the appearance of a case of six weeks' duration.

GENERAL QUESTIONS, UNCLASSIFIED, ETC.

FACTITIOUS URTICARIA.—Our correspondent, Dr. Fr. Ecklund, of Denmark, gives an account of the researches of Edgren on the clinical aspect and pathology of factitious urticaria. After giving a detailed account of the appearance of the wheals roused in sensitive skins by scratching with a pointed instrument (a striking picture of which, by the bye, is given by George Fox in his "Photographic Atlas") Edgren alludes to the *tache méningitique* of Trousseau, which is the same lesion in a less marked degree.

The cause of the wheals depends upon the existence of a peripheral reflex mechanism situated in the vessels of the skin, which in factitious urticaria is in a state of irritability. The treatment of this condition thus far employed has been so unsuccessful that Edgren has abandoned all medication and confines himself to hydrotherapeutic measures appropriate to the case. Unfortunately no details of these applications are given.

SEPTICÆMIC ERUPTIONS.—Dr. Doyon, our French correspondent, gives an analysis of Zaumet's recent thesis on this subject. Zaumet describes various forms of eruption observed in the course of suppurations, of which the most frequent is a polymorphous erythema, displaying at various times the forms of diffuse erythematous redness, rose-red patches, papular erythema, E. iris or E. orbicularis; occasionally a scarlatinaform eruption,—the latter, however, distinguished from scarlatina by commencing with a chill, without any accompanying sore throat, and by their disappearance without desquamation at the end of three or four days. A fugacious urticaria, but slightly pruriginous, is another septicæmic eruption, as also is a form of purpura usually limited to the lower limbs, though sometimes generalized.

These various eruptions are met with in the course of erythema. The bullar and pustular eruptions which are observed in certain cases of suppuration are accompanied ordinarily by purulent infection and show a very grave condition. Their appearance

therefore makes the prognosis much more serious than in the case of the former eruptions.

DERMATOSES FROM MORAL SHOCK.—Under this name our correspondent, Dr. Doyon, alludes to two recent papers, one by Leloir, the other a thesis by Lévêque, describing the lesions of the skin known to follow some violent emotional shock. They report a number of cases of urticaria, erythema, purpura eczema, psoriasis, pemphigus, herpes, vitiligo and calvities, either following directly upon the emotional shock or, in some cases, several days later, but preceded in this latter case by various nervous disturbances, particularly cutaneous neuroses as pruritus, neuralgia, etc. These last dermatoses, which are chiefly observed among women, are remarkable by their sudden appearance, the marked degree of pruritus which accompanies them, and their relatively brief duration.

Two factors predispose to these dermatoses, the nervous condition or impressionability of the patient and her predisposition to skin affections as shown by the previous or subsequent occurrence of skin affections under the influence of other causes.

FEIGNED DISEASES OF THE SKIN.—Cisterne, in his recent thesis, analyzed for us by our French correspondent, Dr. Doyon, has studied the lesions of the skin which are produced artificially with a view to deception, either by soldiers to avoid the duties of service, by prisoners to obtain admission to the infirmary, or by hysterical patients as a result of this singular aberration of the mind which induces such persons to deceive those about them and their physician.

The simulations are produced either by wounds of various kinds, vesicants (cantharides, ammonia, mustard flour, etc.), or chemical caustics, alkaline or acid, or irritants of some sort (turpentine, croton oil, tartar emetic ointment, Burgundy pitch, hemlock plaster, arsenical and sulphur compounds or oil of cade).

Feigned eruptions show a great diversity of aspect within a very small area. They follow an irregular course, compared to the spontaneous eruption which they simulate. The general symptoms of patients often belie their accounts of their feelings. The lesions only occur in such localities as can be reached by the hand. Occasionally the marks of some cutting or bruising are observed, or the streaks of a caustic. Careful surveillance, acute questioning, unexpected visits and observation of the facility with which these

sores heal when hermetically sealed by a bandage, will usually enable the physician to reach a true diagnosis.

PECULIAR VESICULAR ERUPTION IN CHILDREN.—Besnier and Feulard, in a paper reported by Dr. Doyon, our French correspondent, describe an affection occurring among young children which resembles very closely some of the eruptions of hereditary infantile syphilis, though quite distinct. The eruption is situated in the neighborhood of the anus, the genitalia, the inguinal folds and the internal surface of the thighs. It is made up of an arrangement of roundish lesions resembling umbilicated pustules like those of vaccinia or most syphilitic lesions. Presenting at first a minute vesicle, the lesions persist for some weeks, remaining localized. The absence of syphilitic history or symptoms, the continued good health of the children, and the fact that the eruption is always confined to the same locality, will aid the diagnosis.

YAWS.—Our correspondent, Dr. Levi,³⁶ Medical Officer Virgin Islands, reports the opening of a hospital there for the especial care of cases of yaws under the superintendence of Dr. Nichols. It accommodates 75 to 100 inmates. Many cases have been cured. The internal treatment is arsenic, while locally, mercurial preparations, particularly those containing the red oxide, are employed. The disease is contagious and can be inoculated in animals.

TINEA.—Venyski,³⁷ in Pasteur's Institute, has studied the culture of the tineas with great care, and finds that those of ringworm and favus are totally distinct. When cultivated in unfavorable media these fungi lose their characteristics to some extent; but these are again developed in more favorable media.

PHYSIOLOGY OF THE SKIN.

ABSORPTION OF DRUGS BY THE HEALTHY SKIN.—Our correspondent, Dr. Baelz, of Tokio, Japan, has for several years past been engaged in investigating the absorptive faculty of healthy skin, employing the hot baths so extensively used in Japan. He found that salicylic acid is easily absorbed, but that salicylate of sodium and iron salts are not. He comes to the conclusion that no general rules as to the permeability of the skin for solutions of medicinal substances can be given. Each substance must be tried by itself.

THERAPEUTICS OF SKIN DISEASES.

Unna recommends in *lichen ruber* the following: \mathcal{R} Acid carbolic, gr. xx; hydrarg. bichlor., gr. j; ung. diachyli, \mathfrak{z} j. Galchovsky³⁸ has treated numerous cases of *acuminated condylomata* by dusting with pure powdered resorcin. Broad condylomata of the anus may be treated in the same way. Three or four days usually suffice. Ihle uses a 50 to 80 per cent. ointment. Colrat, of Lyons,³⁹ cures *warts* upon the face and hands by the administration of sulphate of magnesium. In children he gives three grains morning and evening. In adults ten grains to a drachm and a half daily. Several weeks' treatment are required. Besnier⁴⁰ uses the following ointment in *pityriasis rosea*: \mathcal{R} acid salicylici, gr. x; pulv. zinci ox, pulv. amyli, āā \mathfrak{z} ijj; vaselini, \mathfrak{z} j.—M. Hertzog⁴¹ says that pencilling the unbroken skin with ten to twenty per cent. solution of cocaine has no effect whatever. He therefore employs the galvanic current, as recommended by Wagner, and uses as an anode an electrode constructed by Stintzing, in which the fluid—the cocaine solution—serves directly to conduct the current. This anode is generally placed upon the forearm, and an ordinary electrode taken in the hand of the opposite side. Galvanic current and cocaine together produce anæsthesia. G. H. Fox,⁴² in an address on "common errors in the treatment of skin diseases," gives some excellent advice. The great error is failure to treat the patient. Better food, more fresh air, every thing that improves the general health comes first. Special treatment of the disease is of no avail without first improving the condition of the patient. Attention to diet is most important: a dietary should be given to patients, who generally thrive best on starvation fare. A meat diet congests the skin; a vegetable diet lessens congestion. In giving directions it is best to tell patients exactly what to eat rather than what to avoid. Water should be taken sparingly with meals and in quantity after meals. Of local applications few are needed. If a substance is to be absorbed by the skin, animal fats are to be preferred as a vehicle. If mere protection is needed, vegetable fats do very well. Vaseline has very little power of penetrating the skin. Arsenic is used too much by general practitioners. As regards skin diseases, it would not be missed if abolished from the pharma-

copœia. Voskresensky⁴³ uses in chronic ulcers the following: \mathcal{R} pulv. benzoin, 5ij; ceræ flavæ, 3ss; adipis, 3ss.—M. The ointment is applied spread thickly on linen to the previously cleaned and dried surface of the ulcer and changed twice, or in large ulcers thrice daily. Behrend⁴⁴ recommends the following ointment in *pityriasis capitis*: \mathcal{R} lanolin, 3j; ol. theobromæ, adipis, āā gr. i; tinct. benzoin, f5ss; etheris, ʒij.—M. Köbner finds that certain medicinal substances are less soluble in lanolin than in the vehicles hitherto used. Chrysarobin, which is almost completely soluble in warm fat, and to the extent of 50 per cent. in vaseline, is scarcely at all soluble in lanolin. K. therefore recommends the addition of 10–20 per cent. of fat in making ointments.

Cocaine.—Lustgarten,⁴⁵ in the *acute* and *subacute* forms of *eczema*, with the formation of numerous vesicles and frequent exacerbations, derives great benefit, as regards diminution of the itching, from a two per cent. solution of cocaine applied with a brush once or twice in twenty-four hours, without otherwise modifying the treatment. The anæsthetic influence is only observed in those places which have been deprived of their epidermis. In *eczema* of the male and female genitals and around the anus, the following formula, in connection with tepid sitz baths and washing with soap, yields good results: \mathcal{R} cocain. oleat., gr. vi–xv; lanolin, 5v.; ol. olivar., gr. xxx.—M. This is to be applied twice daily, beginning with the 2 per cent. ointment and increasing if necessary to 5 per cent. A piece should be rubbed into the affected part for some minutes, and then it should be dusted with some indifferent powder. In *pruritus ani*, suppositories containing 5 per cent. of cocaine may be used. The success of this treatment is particularly striking when *pruritus* is the prime cause. In chronic *eczema* the success is not so great. One per cent. cocaine ointment is a useful substitute for belladonna or opium ointments in painful excoriations or after the application of caustics. The same applications may be made in *herpes zoster*. When a 2 per cent. solution of cocaine is applied several times with a brush to granulation tissue a pallor results, and a crayon of nitrate of silver, or a strong solution of the same, may then be applied without causing any pain. Subcutaneous injections of cocaine are not so satisfactory when practiced near or in diseased tissues, as *lupus*, as in healthy tissues. If used in such cases, the

injection should be made at the distance of one-third of an inch from the diseased patch. Cocaine thus used arrests bleeding to some extent, but when the effect passes off the bleeding sometimes begins again. This should be remembered in operations. Subcutaneous injections of cocaine to the extent of seven to eight minims of a five per cent. solution, are sufficient to cause complete analgesia and enable the injection of arsenic, mercury, etc. After the cocaine injection is made, the canula is left *in situ*, the syringe is filled with the arsenical or mercurial solution, which is then injected in the same place. In Lustgarten's belief, $\frac{5}{6}$ grain cocaine, as recommended by Mandelbaum, is too much to inject daily, and is dangerous, as likely to lead to the cocaine habit. Cocaine is only used in arsenic injections when these reach the strength of 2 per cent. arsenite of sodium solution.

Unna has lately recommended the use of medicated sticks to be employed like the nitrate of silver stick. The basis of these is made up of starch, dextrine, sugar and tragacanth; the medication of various kinds is added in varying strength. The following is an example: \mathcal{R} iodoformi, ptes. xl; pulv. tragacanth, ptes. v; pulv. amyli, ptes. x; dextrin, ptes. xxx; sacch. alb., ptes. xv; aquæ, q. s. The ingredients are carefully mixed in powder form, and enough water is added to make a stiff pasty mass. This is rolled out in strings of $\frac{1}{5}$ inch in thickness and cut into lengths, the formula given yielding 32-33 pencils. The pencils are dried upon parchment paper at the ordinary temperature and wrapped in tin-foil. They are then ready for use. These applications have not as yet been taken up in this country, and we are inclined to think that their employment will be limited.

Ichthyol.—Unna⁴⁶ calls attention to a misrepresentation of his views on the value of ichthyol, by which he is made to say that its external employment is indicated in most skin diseases, and that it should also be given internally in all affections of the skin. The indications for the *internal* use of ichthyol as really laid down by Unna are: (1) In skin diseases, acne rosacea; nervous forms of eczema in persons of a nervous constitution; eczema from teething; lichen urticatus; erythema multiforme; dermatitis herpetiformis; furunculosis; but it is *not* indicated in psoriasis. (2) In the following other diseases [Unna speaks from five years' experience]: acute and chronic rheumatism; bronchial asthma; chronic catarrh

of the stomach and intestines, together with catarrh of the bile duct (icterus); chlorosis tuberculosis, tuberculosis (especially in children), and scrofula; vascular engorgements of all kinds.

Lactic Acid.—Knoche⁴⁷ uses Merck's pure concentrated lactic acid in the removal of tylosis, the acid being applied pure and well rubbed in. The epidermic masses soon softened and were easily peeled off, this result following after a few days' treatment. The affection tended to recur, but finally, under this treatment, disappeared. In a case of chloasma, the acid was applied diluted with three parts of water. Freckles and warts were also removed by the same means.

Lanolin.—There has been much assertion regarding the penetrative qualities of lanolin with but few practical researches into the facts. Guttman⁴⁸ has made a thorough investigation into the subject with the following result. The medicaments employed were iodide of potassium and salicylic acid, which are easily detected when present in minute quantities in the urine. In four patients, iodide of potassium-lanolin ointment was rubbed in and 185 examinations were made of the urine. In 55 per cent. no iodine reaction could be obtained, in 28.1 per cent. there was a trace, in 9.7 per cent. there was slight but decided reaction, in 7 per cent. a decided reaction. In 53 urinary examinations in four patients treated with the same medicine, only with the substitution of lard for lanolin, there was no reaction in 24.5 per cent. of the cases, in 39.6 per cent. there was a trace, in 17 per cent. a slight reaction, and in 18.9 per cent. there was a decided reaction. The salicylic ointments of each kind gave almost the same result. The investigation goes to show that lanolin presents no advantages over adeps as a vehicle in the case of iodide of potassium and salicylic acid, and probably the same comparative result would be attained if the experiments were carried to other medications.

Mollin.—Brooke⁴⁹ gives a résumé of recent publications on the recently introduced basis for ointments known as *mollin* and *salve soaps*. Mollin is made by saponifying lard with caustic potash solution in the cold so that seventeen per cent. of the fat remains free, then warming the mass with thirty per cent. of pure glycerine. It forms a dull whitish body which smears well and is yet of firm consistence, keeps unchanged, washes off readily from the skin simply by the application of water, and does not soil the clothing.

It forms an admirable base for a mercurial ointment, rubbing up quickly with equal parts of the metal, and forming a cleanly ointment. Mollin will also form an excellent basis for all ointments except those soothing ones used for the more acute affections. Kirsten speaks very highly of a mollin ointment made with tincture of iodine with which he gets remarkably good results in all inflammatory and non-inflammatory swellings of the superficial parts, *e.g.*, of the glands, periosteum, subcutaneous cellular tissues, lymph vessels, muscles and skin, the abortive treatment of whitlows, boils and abscesses, chilblains, etc., etc. Kirsten likewise praises an iodide of potassium ointment made with the same base which does not liberate its iodine until brought in contact with the skin.

Unna adopts a somewhat different method of using the same combination. He makes a soft soap by heating caustic potash with lard instead of with oil as in the ordinary process, and to this he adds five per cent. of lard. This mixture, to which he gives the name of *salve soap* or *sapo unguinosus*, he uses partly as a soap and partly as an ointment. Combined with the requisite drug, ichthyol, tar, etc., it is first rubbed into the skin for five or ten minutes, either with wet cotton or with a stiff brush as the case may demand, until suds are freely produced; these are then washed away with water and the skin is wiped dry. By this means the soap and fat penetrate thoroughly into the epidermis and sufficient is left on to form a covering. He does not consider it desirable to add more than five per cent. of fat; but if it is wished to diminish the effect of any particular salve, glycerine, lanolin or vaseline may be added to it. If a large excess of fat is added the character of a soap is lost and the mixture becomes a soap-ointment. The following is the formula for *iodide of potassium salve-soap*: \mathcal{R} saponis unguinosi, ptes. ix; potassii iodide, ptes. j; aquæ, *parvillum*.

The *ichthyol salve-soap* which contains from five to thirty-three per cent. of sulpho-ichthyolate of ammonium, Unna finds of great service in intertrigo, furunculosis, acne rosacea, and in seborrhæic affections from simple pityriasis capitis and dry seborrhæa to universal seborrhæic eczema. *Ichthyol-tar salve-soap* is composed of seven parts salve-soap, two parts oil of lard and one part sulpho-ichthyolate of ammonium. It has the advantage over Wilkinson's sulphur-tar and chalk ointment that lead and mercury

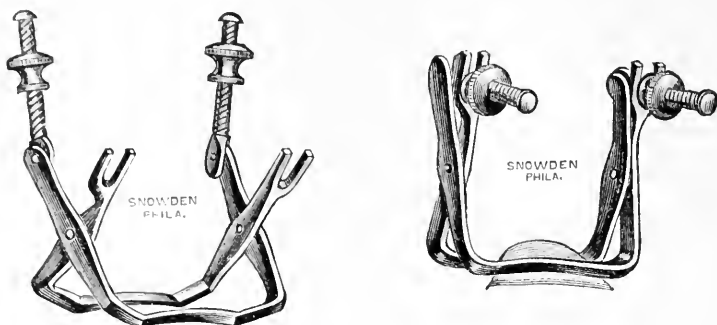
salts can be added to it and that the alkali of the chalk can be dispensed with. It is the best remedy in obstinate limited areas of infiltration, especially sycosis vulgaris, and some varieties of eczema, and when well washed with water is scarcely visible by day.

Klotz⁵⁰ has devised a *compound salicylated plaster* which he has found very useful. It is composed as follows: R̄ empl. diachyli simp., empl. saponati, āā ptes. xl; petrolati, ptes. xv; acidi salicylici, ptes. v.—M. The plaster is of a yellowish-gray color, has no particular smell, and, while fully retaining the qualities of a plaster, is soft enough to be spread readily on linen or muslin by any one not entirely inexperienced in this work. The adhesive powers of this plaster are not very great, and it will have to be fastened to the skin in most localities. Its cheapness is a great advantage.

Klotz's *compound salicylated plaster* finds its chief employment in eczema, where it is useful in all but the acute and highly inflammatory forms of the disease. In ulcers also, except inflammatory conditions, this plaster is very useful. Applied after cleansing and disinfecting by a solution of boric acid, or by the combined boric and salicylic acids, or by corrosive sublimate solution,—not over 2-1000, and supplemented by one or several layers of absorbent or medicated cotton and a muslin or gauze bandage, we have a complete antiseptic dressing which may remain unchanged for five or seven days or longer, according to the copiousness of secretion. Syphilitic ulcers, especially the more superficial, do better under this plaster than mercurial plasters.

Rosenthal⁵¹ has united the two methods of *scarification and massage* in the treatment of certain skin affections. After parallel scarifications of the affected part in several directions, and stoppage of the consequent bleeding, he kneads it with the fingers in a centripetal or circular direction, gradually increasing the amount of pressure. The sittings last from five to ten minutes, and are repeated daily in such diseases as sycosis, or once a week in commencing rosacea. The operation is done without any local anæsthetics, as freezing or cocaine, the application of which is painful. No scars result from the cuts. In addition to acne rosacea and sycosis, brilliant results are obtained by this method in lupus erythematosus.

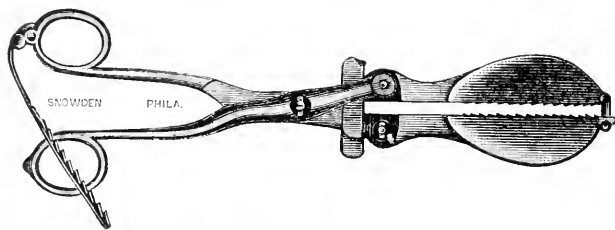
Unna,⁵² the indefatigable and prolific dermatologist—whose multifarious activity fills the German medical journals and keeps the American paste-pot and scissors active—has thrown off, among other trifles, a new kind of *skin forceps*, two forms of which we illustrate. The first is intended to seize a portion of skin in such a manner that it can readily be excised by a knife. The second is



UNNA'S SKIN FORCEPS.—(*Monatshefte f. Derm.*)

intended to use in the treatment of hæmorrhoidal tumors, lipomata, etc.

Stelwagon⁵³ gives his experience in the use of *medicated rubber plasters*. They are not adapted for use in acute and sub-acute cases. In this respect they are inferior to Unna's plasters. Their special field is chiefly in the treatment of chronic sluggish



UNNA'S SKIN FORCEPS.—(*Monatshefte f. Derm.*)

cases of eczema, in the larger patches of psoriasis, in ringworm of the scalp, in callosities, and in lupus and epithelioma. In these diseases, so far as Stelwagon's observations have gone, the plasters have been of positive value.

Piffard⁵⁴ says that in vigorous individuals, psoriasis and chronic eczema will often be benefited by a short sea-bath, followed by rubbing. If the patient be feeble or the bath prolonged, the result

will be unfavorable. Prickly heat, pruritic affections, and furuncles are often benefited by sea bathing. In acute eczema the use of ordinary water is as a rule followed by temporary aggravation of the trouble. In these cases a full bath of one to five per cent. salt solution has been used with great comfort to the patient. In subacute eczema, psoriasis, furuncles, in irritable summer rashes, whether papular or pustular, and in ulcerating syphilides a five per cent. solution of salt may be used with great advantage. The salt-water bath should be used as hot as can be borne, continued for fifteen or twenty minutes, and should be taken just before retiring. Genuine sea salt is not so good for the bath as coarse white salt, on account of the slimy feeling which is left. The therapeutic effects are identical.

Wyndham Cottle⁵⁵ has employed with excellent effect a plaster made of the same constituents as the unguentum diachylon (Hebra), but of such constituency as to be spread upon paper, —paper made of palm fibres, or upon thin kid or muslin. It is employed just as the plasters elsewhere described.

Unna, in an address before the British Medical Association, “on the more recent improvements in the therapeutics of the skin,”⁵⁶ divides the local applications employed in skin diseases into two classes: those whose action is chemical, and those whose action is mechanical. Of the first class, on which he touches lightly, those which have the power of dissolving the horny layer or *keratolytic* agents, caustic potassa, soft soap and salicylic acid may be mentioned. The importance of the latter is greater because we can measure and moderate its effect far more accurately than we can that of soap and potash, and because its actual keratolytic power can be very greatly intensified without at the same time increasing its caustic action. Each has its place, however.

In order on the other hand to make the swollen and defective horny layer harder and thicker and drier, so that it may again become more fit to take up fat and more capable of damming up the centrifugal stream of fluid which flows from the tissues, we make use of *keratoplastic* agents such as sulphur, ichthyol, resorcin, sugar, linseed oil, and in fact all the group of “reducing” agents. These remedies must not be used too strong, or a precisely opposite effect is produced and they become keratolytic.

Turning to the mechanico-physical means of treatment, Unna

speaks of medicated sprays, which have not been as carefully investigated as they deserve. By means of the volatile spray we can not only penetrate the thick horny layer which is impregnated with fat, since the spray dissolves out this fat, but when used on a deficient and swollen horny layer it has a drying effect, owing to the abstraction of water which it causes. It consequently corrects the imperfections of the natural covering of the body in two entirely opposite directions, and is therefore a very effective help, and one which has a wide field for utility. Unna has often, for example, succeeded in curing eczemas by means of the pure alcohol spray, and superficial fungoid affections by means of the chloroform spray. The oleates, the powers of which when used in ointments are often overestimated, attain their highest utility when employed in solution in the ether spray. A thorough investigation of the limits of these cleanly and convenient methods remains, however, yet to be made.

Those physical methods of treatment which have been well tried are next described by Unna. The principle which underlies them all is that the products and secretions of the skin are either accumulated or got rid of by artificial means. Of these products three may be considered: (1) The water-vapor or insensible perspiration which is continually evaporating over the whole surface of the body. (2) The fluid watery sweat which appears in drops. (3) The fatty sweat. The first is restrained with difficulty; the fluid watery sweat may be restrained by covering the skin with water in the permanent water bath. By means of fat we can keep back the watery secretion of the skin much better than we are able by means of water to stem the fatty secretion. The evaporation of the skin is, however, only stayed to a slight extent by the inunction of fat. The conditions in skin diseases are, however, very different from those we have in health. Here simple inunction has a perceptible influence. A more complete retention of both watery and fatty secretions is attained by covering the surface with india-rubber. In every accumulation of secretions brought about by the action of impermeable coverings, the upper skin is soaked with water to the utmost possible degree. The horny layer then approaches in character to the superficial epithelial lining of the cavities of the mouth and bladder, which may be regarded as normally swollen

horny layers, free from fat. In proportion as the horny layer becomes richer in water and poorer in fat, it becomes more permeable, and loses its normal capability of resisting the absorption of substances dissolved in water. Under the impermeable covering the skin becomes transmitted, as far as absorption is concerned, into a mucous membrane. If we wish to obtain from any given drug the strongest possible local or general effect upon the skin, we must apply it to the skin under an impermeable covering. If on the other hand we desire to extract and eliminate the masses of fatty and watery secretion when found in abnormal quantities, we apply to the skin dry porous substances which absorb water and fats readily. Rice powder, the pastes and glycerin-gelatines now in use typify the remedies to be used with this object.

The various kinds of application touched upon have one salient point in common, namely, their influence on the stream of secretion. Either we restrict the secretion in order to favor an unusually strong absorption through the skin, or we promote the secretion; but then we can not expect much absorption. We thus see that we are no longer to look upon the different methods of the application of remedies to the skin as simply accidental, but as the logical consequences of physiological observations on the normal skin and clinical experiments upon the morbid skin.

Unna then goes on to illustrate his remarks by speaking of the glycerin-gelatines, as representatives of the porous coverings promoting absorption of secretions; the salve mulls, as representatives of the best form of the purely fatty covering, and the plaster mulls, as representatives of an application with impermeable covering. As these have all been described at full length in earlier monographs of Unna's, which have been copied in all the journals, we shall not transcribe further.

T. Pridgen Teale⁵⁸ recommends scraping in a number of indolent sores and other external lesions of chronic course. He uses Volkmann's spoon, as modified by Lester (*Med. Times and Gaz.*, 1884), and also the small spoon of Balmanno Squire. In subcutaneous ulceration, where there are large sores with sinuses leading to extensive cavities between the cutaneous tissues and the fascia covering the muscles, lined with granulations and more or less of half sloughy areolar tissue, it was formerly thought that nothing could be done because the patient was strumous or of weak

constitution. Now we can guarantee that all, however extensive or of however long standing, shall be healed in a very few weeks. The course of treatment is as follows: All visible granulations are roughly scraped off a series of sores. The cavities and sinuses are then in like manner stripped by scraping off their granular ulcerative or sloughy lining; and these undermining cavities are provided with effective drainage by incisions at the extremity of every pouch or pocket, perhaps an inch and a half in length and T shaped or semicircular, as a security against premature healing. By these incisions it is provided that no subsequent effusion of blood or serum can possibly collect and lodge. All fluid must ooze out and escape, and the walls must fall into contact, and in the main adhere by first intention. The cavities are then well syringed with carbolic acid solution (1-60), and generally are lined by a thinly spread coating of iodoform. The whole is packed up with an abundant padding of salicylic silk or absorbent cotton wool charged with an antiseptic drug. Occasionally it is well to insert a drainage-tube from point to point. As there is at first considerable sero-sanguineous oozing, it is wise to change the dressing in about twenty-four hours, dressing the new surfaces freely with iodoform, and covering again with a large absorbent pad, which ought not to need renewal for several days. In a fortnight all but the drainage points are as a rule healed.

Scrofulous glands are treated in the same manner. Lupus is best treated by scraping; epitheliomata can be relieved, if not at times cured, by scraping. Teale gives an interesting case of abscess treated successfully by scraping. Buboës, when commencing to suppurate, can be brought to a speedy termination by scraping. In carbuncle, Teale makes a central crucial incision with smaller ones if necessary, scrapes away all the poisonous slough, and soaks all crevices with pure carbolic acid or "*glycerinum acidi carbolici*," charges the raw surface with iodoform, and dresses with some absorbent antiseptic material. Pain and fever cease and convalescence is promptly established. Preputial warts are treated by scraping, with brilliant results.

Valentine Knaggs⁵⁹ suggests emulsions as local applications in skin diseases and gives this formula: \mathcal{R} parafin. molle., \mathfrak{z} j; pulv. acaciæ, \mathfrak{v} vij; acid boric, gr. xvj; aquæ, ad \mathfrak{z} ij.—M. Bismuth, zinc, sulphur or other medications may be applied as desired.

Smear over the skin, a film is formed which is flexible and protective, and the antiseptics and medicaments have the best opportunity of exercising a beneficial influence. By the use of these emulsions all linen and textile dressings can be dispensed with.

Mussy⁶⁰ recommends the following formula in chronic rheumatic urticaria: \mathcal{R} pulv. jaborandi, ext. guiac., $\bar{a}\bar{a}$ gr. iss; lithii benzoat., gr. iii, for one pill. Two of these are to be taken every twenty-four hours; but we are inclined to think a six grain pill would go down better if divided.

Lassar⁶¹ recommends the following in acne: \mathcal{R} pulv. naphthol. (β), ptes. x; sulph. precip., ptes. l; vaselini sev lanolin puriss., sapo. viridis, $\bar{a}\bar{a}$ ptes. xxv.—M. Fiat pasta. The paste is to be spread over the affected area to the thickness of the sixteenth of an inch, allowed to remain on for half an hour, then wiped off with a soft rag and the surface dusted with powdered talc. A slight burning is felt at first which gradually diminishes. The immediate consequence of this treatment is a moderate amount of inflammation; then the skin becomes brown and the epidermis desquamates. All the three forms of acne are improved by this treatment.

For the treatment of melanoderma, Leloir⁶³ covers the colored patches with one or several layers of chrysarobin dissolved in chloroform, over which liquor gutta perchæ is to be brushed as a protective. Superficial small nævi occasionally disappear under the same treatment.

Bockhart¹ believes *impetigo furunculosis* and *sycosis* to be due to one and the same cause,—the “staphylococcus pyogenes,” “aureus,” and “albus,” which are distinguishable only by the color of their pure cultivations. The same cocci have been already recognized as the active agents in the origin of whitlow, acute infectious osteo-myelitis, endocarditis, acute abscess and furunculosis.

The treatment of such conditions is manifestly based upon the removal of the active originators of the mischief. The white blood corpuscles resist the invaders vigorously, but frequently fail to throw them off before they have penetrated deeply and caused much suppuration. Their removal is easily accomplished when the lesion is superficial, as in impetigo, by opening the pustules and disinfecting thoroughly with a 1–2 per cent. corrosive sublimate solution twice daily. In cases of sycosis, epilation must of course

be resorted to. In the case of boils, antiseptic lotions are of little avail, owing to the want of penetrating power; and injections into the diseased foci are unbearably painful. We must therefore content ourselves with mercurial plasters and poultices, with an incision if necessary. Up to the present time we have unfortunately no reliable means of preventing the recurrences to which these affections are so prone.

Voltolini⁶⁴ removes *moles* and *warts* by electrolysis. He uses a battery of five elements and two needles, one of platinum and one of steel, for very hard warts, the steel needle being attached to the negative pole to avoid oxydation. The needles should never be introduced below the level of the skin, nor allowed to touch one another. The action of the galvanic current may be continued from five to ten minutes at most, the needle being pushed in different directions whilst water is allowed to drop on the part operated upon. In from two to four minutes the substance of moderately soft warts becomes pulpy. This is the indication for the operation to stop. This pulp dries up, becomes black and in a week or fortnight falls off.

In *lentigo* Halkins uses pure carbolic acid, of which a drop is allowed to fall upon each discolored spot after careful cleansing with soap and water. The part becomes white and burns for a few minutes. In from eight to ten days the cauterized scale falls off and the spot, at first a rose red, soon assumes its natural color. A recommendable prescription is:—℞ lactis recent., fʒxiiss; glycerinæ, fʒvij; acid. hydrochlor. dil., ℥lxxv; ammon. muriat., ʒj. M. Sig.—Touch freckles with a brush morning and evening.

In *urticaria*, Neely⁶⁵ recommends locally:—℞ glycerol. cap-sici, fʒj; sp. myricæ. ad fʒviiij.—M.

Morton Prince⁶⁶ says that *wrinkles* may be smoothed out by inunctions with lanolin. An antiquated lady has nearly removed from her temples the unwelcome foot-prints of a thousand figurative crows by six weeks' use of it.

In *comedo*, McCassey⁶⁷ recommends the following:—℞ æther. sulphuris. fʒj; ammon. carb., ʒj; acid. boric. ʒj; aque., ad fʒij. M. Sig.—Apply twice a day. The carbonate of ammonia with the grease forms a soap. The boric acid acts as an antiseptic and the ether as a solvent.

Pajor⁶⁸ says of *cocaine* in skin diseases, that the indications

for its use are those afforded by the well-known anæsthetic effect of the drug on the peripheral nerve fibres. In syphilitic or lupus ulcerations, when painful, painting with a 10 per cent. solution of cocaine has a very happy effect. In two cases of specific angina with ulceration of the inflamed and enlarged tonsils, mucous patches on the soft palate with pain and difficulty of deglutition, painting with this solution enabled the patient to eat with comfort and seemed to have a good effect upon the sores themselves.

Previous to painting or cauterizing with caustics, a coat of cocaine is indicated and also as a hypodermic injection. Before such operations as scraping or cutting out small tumors, cocaine has a good effect, not always, however, entirely succeeding in the latter cases. In phymosis the injection of a syringe-ful of 10 per cent. solution between the glans and foreskin enables circumcision or slitting to be accomplished without pain.

In general pruritus, when the skin is unbroken, cocaine can have no effect; but on scratched parts or about the mouth, vulva or anus, it may be useful. Sometimes, when the irritation has started from a localized spot and spreads by reflex irritation, if cocaine can be applied in the form of a 1-3 per cent. ointment to the spot it quiets the general eruption. In this connection Pajor gives the case of a man of 68 years about to end his life in frantic despair from the terrific itching of a pemphigus pruriginosus, (dermatitis herpetiformis A. V. II.) who was relieved by rubbing this ointment into the worst patch. In tinea cruris and pruritus vulva a similar ointment has proved useful.

For hypodermic use Pajor formerly used a 5 per cent. watery solution, but now finds a stronger (10 per cent.) solution more useful. A "Pravaz" syringe-ful (m xv) of this, anæsthetizes near two square inches area. It must be said in warning, however, that the grain and a half of cocaine which this amount will contain, must have decided constitutional effects, and might even at times give rise to startling if not dangerous symptoms, though Pajor says he has given two syringe-fuls, or 3 grains, in several cases, without ill-effect. He gives two cases, however, in which symptoms of poisoning showed themselves. The first was a boy of 15, of scrofulous constitution and suffering from lupus of the face. One minute after the injection of a grain and a half of cocaine into the right ala nasi he began to feel badly. Dizziness and rapidity of

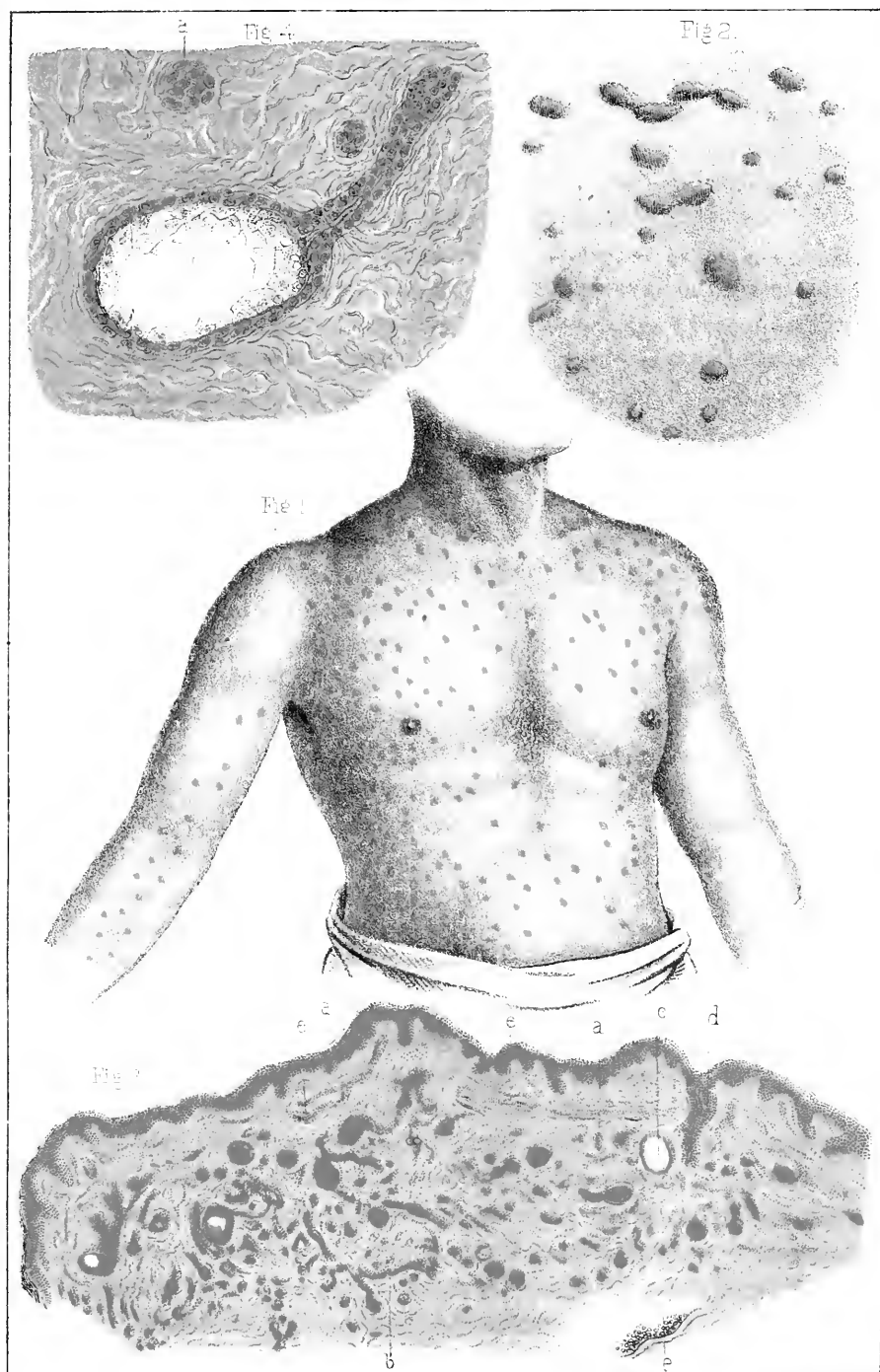
the pulse with pallor and vomiting ensued. Three minutes later the caustic was used in the anaesthetized spot without producing pain.

The second case, a nervous woman of 48 suffering from lichen ruber received a hypodermic injection of about a grain of cocaine. A piece of skin was excised but the operation caused great pain. Three minutes later epileptiform spasms supervened, the head moved continuously up and down on the pillow, the pupil was dilated, pulse and breathing quickened, and insensibility lasting for three hours ensued. By the following day only a little headache and debility remained. Pajor has never observed chronic cocaine poisoning. In cases like those cited he recommends a few drops of amyl nitrate as an antidote.

Eruptive Hydradenoma.—Under this title Jacquet and Darier⁶⁹ describe the case of a healthy man 26 years of age who eight days previously had first observed the eruption for which he sought relief. It had first appeared below the clavicles and had gradually spread from that point. On examination the eruption was found to be confined to the anterior aspect of the trunk and the flexor surface of the arms.

On the trunk the eruption began at the base of the neck, which it half encircled. It covered the pectoral region on both sides and ran around the anterior border of the axillæ, but extended in toward the posterior edge. The axilla itself was free. From the semi-pectoral region the eruption extended down over the chest, diminishing downward and not passing the level of the umbilicus. The region occupied on the trunk corresponded closely to that covered by the anterior plate of a dragoon's cuirasse. (See colored plate, Fig. 1.)

The lesions were uniform in character, being small rose-colored elevations, easily perceived by the touch, but soft and only slightly infiltrated. They varied in size from that of a pinhead to that of a pea, and were covered by smooth finely rugous epidermis without perceptible scaliness and without any orifice at the summit. The surrounding skin was quite normal. Most of the lesions were isolated, but a few were irregularly grouped. (See Fig. 2). Their form was commonly oval, with the greater diameter parallel to the direction of the folds of the skin and arranged in parallel striæ. More numerous, larger and showing a deeper color in the superior



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Hydroadenoma. Jaque^{re} chinensis
 Annelee de L-mastikane
 G. Mason, Pub. Paris



pectoral region, their number and size diminished progressively toward the abdomen. There was little or no pruritus. On the arms some few lesions scarcely visible could be seen, more numerous on the right side. The patient said that the individual lesions had not increased in size, though they had in number.

The patient was ordered iodide of potassium in the dose of thirty grains per diem. Locally tartarated glycerine, and *sapo viridis* containing 2 per cent. salicylic acid. These applications irritated the skin without influencing the course of the disease in any way.

Sections of the little tumors gave the following results:—in the middle of the thickened connective tissue of the derm a low power revealed (fig. 3) a great number of epithelial tracts, nearly cylindrical in shape, ramifying in all directions and about the diameter of a sweat duct. Cut transversely they were circular or oval; cut longitudinally they presented the appearance of tubes with occasional horn-like ramifications.

Almost all these epithelial tracts showed globular dilatations like epidermic globes, but which were in reality minute cysts containing amorphous masses of a refracting character. These epithelial growths were exclusively intradermic. Neither hypoderm nor papillary layer were affected.

An examination of the sections under a power of 300 to 400 diameters showed that the tubes were not contained in a limiting membrane, and that the cells composing them were epithelial in character. The tubular appearance was found on close examination to be due to a degeneration of one or more of the central epithelial cells which contained a refracting globule. When many were thus affected a sort of cyst was found (fig. 3 a and fig. 4). The question was whether or no this structure was epitheliomatous. The conclusion reached by one author is that the growth did belong to the class of tubular epitheliomata. It was important in consideration of the close resemblance between the epithelial tubules and those of sebaceous glands to ascertain whether there was any connection between the two. This our authors seem to have established almost certainly, as may be seen in fig. 3 d and fig. 4. Though no actual connection could be observed between the sudoriparous glands and the epithelial growths our authors believe themselves justified in calling the growths

adenoid epithelioma of sudoriparous-glandular origin—(or more succinctly *hydradenoma*)—with colloid cysts.

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TUMORS.

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CARCINOMA.

UNDER the inspiration of Prof. Hayem, Alexandre,¹ of Paris, has studied the nature of carcinoma and the relation of the white corpuscles to it. The number of observations necessary to establish even the likelihood that the white corpuscles are increased in number in this disease is unlimited. The natural variations in the figures which occur within the range of health, as well as those due to morbid states other than cancerous, add enormously to the work of observation. For a number of years the editor has been convinced that an augmentation of the white corpuscles was present in certain stages of development of some cancerous tumors, and that in many instances this change of the blood was of great service in confirming an otherwise doubtful diagnosis. Apparently the seat and character of the tumor have an influence in increasing the white cells. It has seemed to him that carcinoma of the liver, the stomach and pancreas, perhaps especially after the secondary involvement of the neighboring organs, had more influence than tumors of the mamma, while epithelial growths had no influence. It has seemed, too, that in the earliest stages of development the characteristic increase—if he may call by so definite term a thing in itself so very indefinite—is more readily pointed out, and that later alterations in number became confused and difficult of discernment through the progressive development of other hæmic changes. For example, after the cachectic aspect comes, or during the starvation stage of gastric carcinoma, and especially when it has ulcerated, the alteration fades away. This state of the blood is an important one, if the condition can be fairly well made out,—important in a double aspect; in the first place for diagnostic purposes in those obscure gastric and hepatic cases; secondly, as an assistance in forming a more certain and creditable theory of the

origin of cancer than exists at present. If, for example, it could be shown that prior to and during the developmental stage of a cancerous tumor the white cells were redundant, this fact would go very far to render it probable that the epithelial and glandular carcinomatous growths owed their origin to and derived their formative cell elements from the white corpuscles of the blood. This origin of the new growth would be more probable, for example, than that the tumor formation came about from direct local irritation and consequent perverted action of the cells of the part involved. Thus, in a gastric cancer we should not look to a dyspeptic irritation, or in tumor of the mamma to the effect of an injury, as causing or compelling the epithelial cells to change their nature and wander back through the basement membrane on which they have been growing, or as causing the subepithelial connective tissue to commence growing to form a cancerous tumor. Such are the accounts we now have of this matter. Not even Creighton's theory of the spermatic influence of cells helps very much to a full understanding of their origin.

But if we could start with the fact that prior to and during the development of these tumors there existed a pretty constant and regular increase of white blood corpuscles, of a perverted character,—from whence and how perverted we know not,—and from these data follow out step by step the normal physiological process of growth and repair of epithelial surfaces and glands, the history of the origin of the pathological new formations would accord completely with the normal growth. At all events, the pathological process would no longer be regarded as something wholly foreign to and different from the physiological. In the normal condition the repair, and perhaps part of the growth of epithelial tissue, is effected by corpuscular elements, derived from the blood,—white cells potentially epithelial,—which, coming out from the capillaries of the part, wander through the connective tissue, come to the basement membrane, pass through it and appear first as germinal epithelial cells. This process cannot be studied in the normal, because the rate of growth is too slow; but in conditions of great activity, approaching inflammation, this repair of waste, which is then very active, can be studied. Now for the theory, let us suppose a cancerous tumor to be on the point of development, with the blood containing an increased number of

white cells,—the increased number of which, at least, are potentially epithelial in character. A local irritation occurs to determine the seat of the tumor formation, and at this place the wandering (epithelioid) white blood corpuscles are detained and prevented from passing through the basement membrane. They start to grow in the subepithelial connective tissue, and the outcome of their growth is an epithelioid tumor,—a gland-celled or squamous-celled carcinomatous new formation. The epithelial cells grow down there, and growing spread through the connective tissue, as we find them, but trying to imitate, as closely as their unfavorable situation will admit, the normal. This theory brings the pathological into entire accord with the physiological, and the cancerous tumor is defined as a growth of epithelial cells *out of place*. The greater malignancy of the carcinoma over the sarcoma is also accounted for,—the sarcoma is growing *in place*, that is, growing, as we always find it, in the connective tissue group of structures.

But here is not the time, nor does space afford the opportunity, to speak of the theory of development of malignant tumors. Let us turn to the results of Alexandre's enumerations of the white corpuscles. He considered 6000 as the mean in each cubic millimetre in the normal state, and 9000 as the maximum physiological limit; when more than 10,000 are present it is to be regarded as a leucocytosis. These figures, although supported by Hayem, seem too high; for although these numbers are perhaps often reached in non-morbid conditions, the augmentation is transitory. If 9000, or even 8000, were maintained constantly the editor thinks the condition ought fairly to be held as a leucocytosis. In all the author has examined 46 cases, involving 16 various organs and in all stages of progress of the growth, of ulceration, and even after removal of the tumors. In 14 cases of tumor of the breast the average of white globules was 11,464 to the cubic millimetre; the highest was the enormous figure 21,700, and the least 7370. His results for tumors of other varieties and in other parts of the body, of course, differ in individual cases; but they show, in the main, an excess of white corpuscles. The epitheliomatous growths form an exception to the rule, since only under peculiar conditions was the augmentation found. It is interesting to note that in six cases after removal of the tumor by operation, a diminution of the white corpuscles followed.

Dr. Scheurlen,² in discussing the etiology of carcinoma, speaks of the rapidity with which one disease after another has had its cause made clear since the commencement of the studies and discoveries in bacteriological science. Infectious diseases and those not hitherto regarded as infectious have been brought within its range, and we have learned to know their cause in a bacillus or a coccus. The tumors alone have remained untouched and no one has been ready to pronounce the carcinoma and sarcoma infectious. There are some clinical observations which indicate the possibility of their inoculation, but they rest on uncertain foundation and are not generally credited. There are, too, authentic cases of the spread of carcinomatous growths after tapping of the abdomen for the withdrawal of ascitic fluid, and von Bergmann has pointed to the spread of epithelioma from the under lip to the part of the upper lip directly in contact with it. Bernhard von Langenbeck (1840), Follin and Lebert, O. Weber and Goujon succeeded in transferring carcinoma from man to animals, and from one animal to another; but other observers showed only negative results from similar experiments, so that great doubt has hung over this question. The nature of causal force of these growths has remained unknown.

The point of departure of Scheurlen's experiments were ten mammary carcinoma with their glands, given him by Burkhardt from the Stuttgart Hospitals. He took the tumors away from the operation table, well wrapped up, to carry out the microscopic examination and the inoculations at his home. He had also the opportunity of experimenting with lymph glands and portions of mammary tumors from 4 cases, and one tumor of the uterus, 5 carcinoma of the cervix, 3 metastatic masses of the liver and 1 of the stomach. The culture fluids were serous effusions drawn from the pleura, and also from hydrocele and ascites, which were sterilized for 5 days by Koch's method and, finally, for one day the heat was raised to 80-90 degrees to coagulate the serous fluid.

Scheurlen's, after making cultivations, experimented on dogs by injection of the cultures into the mammary gland the result being that within the following 14 days a tumor, often the size of walnut, originated, of pretty soft consistence and not distinctly circumscribed. This decreased again shortly to the size of a hazelnut or bean, "but became firm and hard, keeping this size,

seeming indeed to increase somewhat." The autopsy of two dogs, one on the 28th and the other on the 35th day, dying from the injection, showed a tumor the size of a hazelnut firm in the adipose of the breast, not attached to the skin, from which it was doubtful whether it had originated from lymph gland or from the tissue of the mammary gland. Microscopic examination showed cell growth, enlarged, markedly granular cells, which here and there deserved the name of epithelioid, and in which could be recognized the shining spores exactly as in carcinoma. Microscopically, just as in the cultures, the carcinoma bacilli could be recognized. This result was arrived at in two dogs: the other four were to be allowed to live a somewhat longer time to observe the further course. A report of the result is promised by the author, who gives the following as the results which he thinks his observations warrant:—

(1) The constant production of the bacilli by means of pure cultures; (2) the constant proof of spores of this bacillus in microscopic preparations of the morbid products; (3) the result of experiments on animals that this bacillus stands to carcinoma in the causal relation; that it is the cause of carcinoma.

Schill,⁴ of Dresden, has been engaged since 1882 in the search of the cause or excitor of carcinoma and sarcoma, and reports that from May, 1887, he has been able to recognize in sections of tissue, as well in scrapings of the juice, micro-organisms which he has demonstrated to numbers of his colleagues.

By Gram's method, modified so that the section after 3–5 minutes in iodine-iodide of potash solution was transferred to absolute alcohol for some minutes, then into hydrochloric acid and alcohol 2–3 minutes, and finally again into absolute alcohol, with the result that the whole of the carcinomatous tissue appeared scattered over with intensely colored violet points, and it seemed always that two or three of these points were found at regular distances from one another. By prolonged and careful observation it was discovered between the two points, a crystal clear body, the colored points presenting themselves as the poles of this body.

It appears like a match with a head at each end. There were also many bacilli with a dark stained dot in the middle, or with a row of points found through the crystal clear thread. These colon bacilli are found spread over the cancerous tissue in great

numbers. The size the author estimates as one and one-half to twice that of the tubercle bacilli. The difference of the size of the stained points is striking and corresponds with the bacilli in one and the same preparation.

Also in many cases of sarcoma the author found bacilli of the same character, only considerably smaller in dimensions than in carcinoma. From the same sarcomatous tumor the author grew a mould fungus (*schimmelpilz*), which at the temperature of the room in 10 p.c. nutritive gelatine, formed in the deeper part a pure white radiating branched mycelium and on the surface a bluish-green turf of spores. The mycelium form threads with branches almost at right angles and with septa at regular intervals. The threads give after a limited period of growth, after staining with fuchsin and carbolic acid, and bleaching with acetic acid the following appearance: in the unstained thread-tubes are numberless intensely red stained points, connected also by a crystal clear body. These red points are partly along the inner side of the mycelium tube, partly in its centre, placed at one time in the long axis of the fibre, again transversely. The spores formed on the surface of the gelatine have a short cylindrical figure with slightly pointed ends. The author thinks, as the result of cultures from carcinomatous tissue, that the carcinomatous bacilli as he has described it, is not a true bacillus, but most likely a stage of growth of some fungus.

The staining methods, so far reported, do not help in their identification, or distinguish these bacilli from other forms. Scheurlen reports that nearly every method serves. Gram's method gives very good pictures; the color is mostly at the ends and it is confined to that part; it is bipolar colored, points placed near each extremity and not dotted along the interior, like the spores in a mycelium thread, as described by Schill. Schill's bright colored points are apparently spores, enclosed in their fibre or thread. [He has stained them only by Gram's method slightly modified.] The spores of Scheurlen's cultures, he says, stain by none of the usual ways. He gives a special method for them, and on the suggestion of Ehrlich, found also the tubercle stain efficient.

It is important to note that the English observers, when they obtained any growth on solid media, describe it as a "thin milky white or pale yellow film, spreading over the surface from the piece of tumor in a sinuous or wavy outline." This description

answers very closely to Scheurlen's: "a colorless film over the whole surface of the serum, gradually becoming folded, and after weeks or days taking a brownish yellow color." In this film Scheurlen finds his bacilli and spores, while the English experimenters "display different forms of cocci. In the liquid gelatine, rods, long and short, and streptococci, were at different times discovered." It is very important for us to know—nay, it is a vital fact to be made clear—whether Scheurlen found only the forms which he has mentioned, or whether he saw also "the organisms (of which the English observers speak) the same apparently as those described and figured by different observers as occurring in healthy living tissues." These two sets of experiments have as a result the same sort of "figured" growth (on which so much dependence has been placed recently for the identification of micro-organisms—perhaps too much dependence), and yet competent experimenters report not only unlike forms of organisms, but mixed and indifferent forms in the same "figured" growth. It must be noted, in judging of the value of these observations, that none of the reporters speak of obtaining pure cultures. Perhaps this part of their record has been omitted in the reports furnished us. The degree of "purity" is only of moment in Scheurlen's work, who alone has "tested" his results by animal inoculations. Of the results of this branch of the experiments it is not as yet just to speak: they are still in an immature condition. We can hardly be expected to believe that Scheurlen has produced, by the injection of a culture growth, pure or impure, a glandular carcinomatous tumor in the mammary tissue of a dog. Finding epithelioid cells, even when in conjunction with spores and bacilli, does not constitute a cancerous tumor.

The observations of Scheurlen have not been received in Berlin with great favor, or without sharp criticism. It is whispered, in the first place, that bacteriological observations which do not originate in Koch's laboratory, but only in Leyden's clinic, must not expect too much attention; in the second place, at the society's meeting when Scheurlen read his paper the discussion showed a too ready acceptance of the discovery on the part of some, and what seems to be cavilling objection on the part of others. Guttman, of the Moabit Hospital, seemed to express the opinion that

no further proof was needed of all disease being due to micro-organisms; and now that Scheurlen had exhibited a microbe so easily, so ready of culture, and so obvious in its results, and the organism being also found in the tumor, its causal relations must be accepted as established. He was ready to excuse the defects of the observations. Fränkel objected to the reception of the discovery on the ground of want of exactness in Scheurlen's methods. He compared it to Koch's prolonged work in tuberculosis, and spoke of the difficulties in isolating the pathognomic bacillus and the necessity of the fractional method of culture for this purpose. If this is Fränkel's only objection to Scheurlen's method, his criticism seems quite superfluous, since according to Scheurlen's report, that observer encountered no other forms of organism, and therefore the fractional cultures were entirely unnecessary in his experiments. That this work was not necessary for exactness is quite readily to be believed, from the different conditions of the morbid developments of tubercle and carcinoma; in the former, the lungs are most open to the intrusion of every kind of parasite, while in a very large number of cases the cancerous tumor is shielded by the integuments. It is only necessary to select the specimens, as it is probable Scheurlen did, in order to relieve himself of this trouble.

Chas. A. Ballance and Saml. G. Shattock,⁵ of London, undertook some experiments during the year with a view of determining whether malignant growths, which have, they state, so many and such close analogies to the infective granulomata, have a similar micro-parasitic pathology. Their work is still in progress; and although they have established the fact by these experiments that no micro-organisms admit of being cultivated from malignant new growths on any of the chief media at present in general use, they hold, nevertheless, that the parasitic theory, in some form or other, is the most probable of any of those yet advanced. These observers express the opinion that "perhaps the chief advantage of their parasitic hypothesis as a working basis is that it admits of a clear and definite conception, and the weakness of any other view (except Dr. Creighton's, on which they offer a short criticism) becomes at once manifest. In a previous discussion of the merits of this theory⁶ they have already contended that it recommends itself as bringing the essential pathology of infective tumors into

intelligible relation with other diseases, the parasitic pathology of which admits of demonstration. They decline for the present to discuss the two factors in every specific disease, viz., the constitutional disposition and the micro-parasite, as it is impossible now to say (supposing the parasitic theory is true) what is the relative importance in cancer of the personal element and the infective agent. They state that in malignant tumors, beyond doubt, it is the *infectiveness* that constitutes the important mark of the disease. The character of infectiveness is plain in the local invasion of the tissues around by the morbid growth, in the secondary implication of the lymphatic glands in anatomical relation with the tumor, and in the general infection of internal organs. Some cases of rapidly disseminated peritoneal sarcoma are hardly distinguishable by the naked eye from those of tubercle. They go on to say that the secondary disease arises from the transference of elements from the primary tumor is shown in the likeness which the secondary growth bear the first. They state the questions at issue to be, (1) what is it that gives rise to the unnatural epithelial overgrowth in carcinoma? and, (2) what leads the elements transported along the lymph channels to continue their abnormal growth, and serve as sources of a tertiary series of tumors? In regard to these questions it is important to notice that the mere transport of a normal cell is not sufficient to lead to the growth of a tumor, as shown by Leopold and by Cohnheim and Maas. These observers have shown that young tissue, if transplanted, grew for awhile, and then atrophied. Epithelium grafted on granulations does not penetrate the deeper tissue, but continues to grow as squamous-celled epithelium. These cells grow according to their natural capacity and hereditary tendency, and somewhat in accordance with the physiological requirements of the part to which they are transplanted. "What is it, therefore, that imparts the abnormal property to the cells in infectious tumors?"

The authors speak of Dr. Creighton's well-known theory that the diseased cells exercise a spermatie influence on the tissues around, the elements of which they excite to multiply and assume characters similar to themselves. For, as they have urged, the moment and manner of the acquirement of this spermatie influence yet requires demonstration. They point to the argument which has been advanced, — that in such infective, micro-parasitic

diseases as actinomycosis, tubercle, or syphilis, the new formations are chiefly or simply inflammatory, not epithelial. In sarcomata, however, the anatomical forms are more or less closely like those of inflammatory processes. And in carcinoma there are all the signs of inflammation combined with the epithelial overgrowth. They compare the spreading columns of epithelium in a scirrhus carcinoma surrounded by inflammatory tissue to the spreading mycelium of the fungus, the surrounding tissue forming the meshwork within which the growing parasite is confined. In carcinoma the essential element is the spreading epithelium; "and it may be held that the difference in the different cases implies a difference in the *habitat* of the irritant." In other words the predilection of the micro-parasite for the epithelial, connective, or other tissue determines whether the new growth is a carcinoma, a sarcoma, or other tumor form, just as among plants the same insect produces different kinds of galls according to the different site of the oviposition. The efficient agent of infection in the two cases, however, may be different.

Domingo Freire,³ whose name is connected with some recent studies of yellow fever and also the preventive inoculations in cholera, has examined the blood of a cancerous patient, and discovered zooglea, which grow on gelatin at 37-40 C., and develop into bacilli 0.011 mm. in length by 0.002 mm. broad, slightly enlarged at one extremity. In the cultures were found spores, zooglea and small bacilli, which were supposed (only) to be various stages of development of the bacilli. This variety of matters was injected into guinea-pigs, of which only one seems to have died at the end of a month, and a large tumor was found about the size of a hen's egg, which on section exuded a viscid substance. By microscopic examination, Freire convinced himself that the tissue of the tumor was that of encephaloid carcinoma. An attenuation of the virus was effected by passing it through a number of birds, so that animals inoculated with the attenuated virus resisted the stronger preparations. It would seem more probable that the mass, which Freire describes, was a tuberculous abscess or deposit, judged by the mixed solution injected, rather than encephaloid carcinoma, since the author speaks of finding giant cells.

The most important and most striking work in connection

with tumors during the year is undoubtedly the observations on the micro-parasitic cause which have just been given.

Sir James Paget's Morton Lecture on Cancer and Cancerous Diseases⁸ is occupied with the "study of the likeness of these diseases to others of which we have already means of useful treatment." In the direction of some of the specific and micro-parasitic diseases, he believes the likeness to be very intimate. The lecturer indicates the insufficiency and inaccuracy of the definition of tumors, and while typical instances are easy of description, so many are on the border lines verging toward the other forms or even to the normal growths. The cancer, while imitating in some degree the natural structures, seems "growing as if with a self-possessed power of maintaining and increasing" itself. Like the natural structures, they are also dependent on external conditions; but their growth is not "in evident adjustment to the plan of other parts, and is not subject to the general control which, in health, keeps each part in useful association and concurrence with every other." He characterizes the method of growth of innocent and cancerous tumors alike as purposeless and selfish, indicating a close affinity between them, and this method "is rarely seen in any other disease than these and some specific diseases." He speaks of the term malignant and approves of its usefulness, "the degree of malignancy usually corresponding with the degree of unlikeness to the natural structures" in which the growth is situated. He defines specific diseases, as he did more than thirty years ago, as those "in each of which the phenomena of common diseases are modified in some constant and definite manner which gives them what we call specific characters. Thus each specific disease is due to the influence of a distinct morbid substance on some part or parts at which the characteristic signs can be and are manifested. Two conditions must coincide in each: the one general or diffused, in a morbid material in the blood; the other local, in some part with which this material produces diseases." He uses the vague term "morbid substance" to avoid definition or exact description, but says that "the reasons are, indeed, constantly increasing for the belief that each of many specific diseases is due to morbid changes produced directly or indirectly by a distinct species of minute parasite, or some other vegetable of lowest organization, yet specific. I believe that micro-parasites or substances produced by

them will some day be found in essential relation with cancers and cancerous diseases." He would place cancer in the group "that includes, as its chief members, syphilis, tuberculosis, glanders, leprosy and actinomycosis, each of which is known to have a distinct micro-parasite."

The editor is glad personally to find that Paget is willing still to speak of the cause as "morbid substance," especially in view of the failure of Ballance and Shattock, in London, to find a micro-parasite satisfactory to them, and of the unsatisfactory observations in Germany. It affords a respite, however short, before all diseases fall under the ban of being considered as of parasitic origin,—a ban which cut off all hope of their physiological pathology ever becoming understood, at least until such theories are again discarded. The parasitic origin of tumors is such an old story, and our present vaunted precision of observation does not serve to make it surer or truer than such theories were two hundred years ago. Let us go one moment over the early studies of the inoculation from one individual to another for the propagation of tumors. If it were true that a microbe is the direct and potent cause of a tumor formation, then the transference of a suitable slice of a tumor, containing abundant microbes, ought to produce in the inoculated animal a new growth with greater certainty even than the injection of a pure culture of the microbes. Because in the first place, the microbes are equally present in both the inoculating matters, and surely ought to grow; and, in the second place, if the microbes of the pure culture hesitate about growing they are without the excuse (which is not a valid excuse) that the normal tissues in which they are newly placed resist their growth. The microbes in the tumor slice ought not to fail to develop, since they are accompanied by a suitable nidus of already perverted tissue in which they have been growing and in which they ought to continue to grow and from thence spread their influence.

Paget points out the most important general agreements of cancer with the other members of the group, viz., tubercle, syphilis and others. And, first, these are placed by Virchow among the tumors, as granulomata, and many of the group deserve this name equally with certain carcinomata. Then all of them tend to degeneration and ulceration, special and characteristic for each. The infective propensity which all of them exhibit by their invasion

of the adjacent parts through varied channels, "is evidence enough of essential likeness and close affinity in tuberculosis, syphilis, leprosy, and the rest; and as we know that there is for each a specific morbid material in the blood, so we should believe that there is at least one in cancer and cancerous diseases." The same argument is applied to the specific fevers. And while this argument may be convincing of the specific form and character of these diseases, it is not convincing, nor does it appear likely, to the minds of many, that the specific agent is a microbe.

Paget's next most interesting comparison for the elucidation of these questions are the likenesses found in vegetable pathology. For example, in the xylomata he finds the best evidence—nearly proof—of the truth of one of Cohnheim's explanations of the origin of tumors from portions remaining undeveloped. The woody tumors are from buds, or "sleeping eyes," which have been "overgrown" by the normal structures. The only likeness to these woody tumors, so-called, which is found in our tissues are the dermoid growths. But the dermoids arise from germinal tissue, not merely "remaining undeveloped," but growing "out-of-place;" whereas the buds, or sleeping eyes, of a xylomata are only parts adventitiously covered over,—not out of place. If the bud is released, it will grow into a normal structure,—a fact which cannot be predicated of the dermoid tissues. The one does not grow because it is infolded; the other would *not* grow, but waste away, unless it were infolded. It would seem, then, that this comparison, for the purposes of elucidation of tumor growth, from the want of sufficient likeness, fails. "Galls illustrate the influence of a virus in exciting morbid growths;" and while the gall growth is not wanting in specific appearances, it is deficient in the virus. Since it is difficult to suppose that the physiological process of egg-laying is attended with a virus, the eggs cannot be looked at as "pathogenic." It is more like a local mechanical hurt. Although there are more than a thousand forms of galls known, each produced by a distinct insect, and therefore specific, galls can also be formed by non-specific agents, for which it is not supposable even that a virus could be present. Something other than similarity is necessary for specificity. Galls are certainly not infectious, according to Paget's definition, since they do not spread "through the lymph spaces, the lymphatics, or the blood-vessels"; nor can they be said to

invade the adjacent parts. And this is infectiveness. They also fail to show infection, in that galls do not make the oak-tree "ill" or diseased. It is difficult to think of the human body bearing successive crops of malignant tumors of an infective character.

The lecturer's remarks, in the highest degree instructive and well-reasoned concerning the general as opposed to the local origin and nature of cancer, and for the illustrations of the probable causes of its choice of the seat of growth, serve as a most distinguished and conspicuous monument of the wide experience of this great surgeon, but they do not offer proof of the probable bacillary cause of tumors. They serve as well if cells are substituted for the bacillus as the efficient producing force. When a cancerous tongue infects the buccal mucous membrane we may be sure it is done by a transference of cells; and when the mammary tumor gives rise to an hepatic cancerous nodule, it is open to observation that it has been transferred, since the malignant cell, so-called, can be seen obtruding itself and displacing the normal hepatic cells. Turning aside from the micro-parasitic origin of tumors does not compel a belief in their spontaneous development. Other forces can play in our environment and disturb the physiological growth; otherwise it would become necessary to suppose a bacillus acted to carry on normal existence. Life is modified and changed to a degree comparable to disease by the environment, but without disease and without a bacillus.

The question of the behavior of the muscular fibres in the presence of malignant growths and their participation in the formation of such tumors, has been the subject of prolific discussion. Schroeder, Van der Kolk, Kölliker, Boettcher, Neumann Weber, Förster, Billroth, Cornil and Ranvier, and others, all spoke of the proliferation of the muscular nuclei and indicated their participation in the formation of the new growth. Even Virchow did not deny this possibility, but did not consider it demonstrated. But many believed that the new elements transformed themselves into cells of the tumor. Others did not admit that the muscular tissue could transform itself into another tissue, and they denied absolutely the participation of the muscular corpuscles in the formation of the neoplasms, except myomata, and considered the proliferation of the corpuscles as one phase of the degeneration and atrophy of the muscular fibres.

Cristiani,⁹ working in the laboratory of Cornil, has found that the muscular fibres show different modes of involvement, degeneration and disappearance, according to the character of the primary growth by which they are affected; and this divergence corresponds closely to the expectation, *à priori*, from the mode of growth of the respective tumors. In carcinoma of the breast there are often found cancerous nodules in the midst of the muscle which traverse its length and intersect its fibres, pushing them aside; but this is not to be looked upon as a true cancerous degeneration. In other instances it can be seen on sections perpendicular to the length of the muscle, that the general arrangement of the cancerous alveoli closely resembles the normal muscular tissue. The site of the muscular disks, as seen on cross-section, are occupied by epithelioid cells, and the whole presents the aspect of an acinous gland, having for its framework the envelopes of the muscular fibre. The connective tissue in the part thus invaded becomes firmer than before. In the intermediate zone between the cancerous tumor and the normal muscular fibre there are to be seen in the interfibrillar spaces very many cells,—some of large size, with large nuclei not very numerous, others generally small in size and much more abundant; the former are epithelial, the latter embryonal in character. Some of the muscular fibres here appear normal, others are seen to have one or more large epithelial cells in their interior. Some of the fibres are completely filled, and the contractile substance diminishes as the cells augment. The cells which are found within the fibres clearly have entered it from without. Not infrequently these cells are seen pressing up against the sarcolemma and partly through it, and at these parts the muscular nuclei show little or no reactive process. Sometimes they are slightly swollen, but never exhibit the characters of epithelioid cells.

Cristiani concludes that in carcinomata, the muscular fibres sometimes simply atrophy, with or without a preliminary proliferation of their nuclei. In other instances the epithelial cells penetrate into the muscular fibre and destroy it in detail, in which case the muscular nuclei show no reaction.

A report of the Collective Investigation Committee has been prepared and published under the care of H. T. Butlin,¹⁰ of St. Bartholomew's Hospital, London, concerning cancer of the breast.

Gross found that of 365 women who had borne children, there was antecedent mastitis in 71. In the Inquiry, out of 174 returns 27 showed mastitis (Gross, 1 : 5.5, Inquiry, 1 : 6.5). Nothing is reported of the resulting condition of the breast after the inflammation. Only 4 cases had suffered mastitis shortly before the tumor developed; and in the others from 4 to 40 years had elapsed—in 10 of these instances more than 20 years—between the suppuration and the tumor. So that as the proportion of cases in which the occurrence of mastitis is chronicled is small, it can scarcely be conceived that it plays an important part in the production of cancer. Nor does it appear probable that it should do so; for the inflammatory conditions which are recognized as predisposing to cancer are almost always of a different kind, frequently recurring, like the attacks of superficial glossitis; or continuous, like the so-called eczematous conditions of the nipples; and the effects of past inflammation, such as scars and warts, if they become the seat of cancer, are almost always so situated that they are subject to injury or irritation, and are thus encouraged into cancer, if one may use the term."

On the question of *Inheritance*, of the 210 returns there was no family history of cancer in 116; while in 68, other members of the patient's family had shown cancerous affections. This is in the proportion of 1 : 2.7,—and Paget's figures¹¹ were 1 out of 3 in his private patients. It is evident that a history of cancer in a family does not of necessity imply a history of inheritance of the disease; and the Inquiry endeavored to seek the chief evidence for the theory of inheritance in (1) the occurrence of a few cases of cancer in many families, and (2) in the occurrence of many cases of cancer in a few families. Under the first head, it was found that 68 patients had 99 cancerous relatives; 44 having only 1 cancerous relative, and the rest 2 to 4. The disease in the cancerous relatives affected the breast in 34 cases. The report discusses the "line of descent," from which alone inheritance can be predicated, and this consideration at once reduces the 68 family histories to 38 in which a true inheritance is found. The proportion changes from 1 : 2.70 to 1 : 4.84. Many circumstances and conditions are adverted to which, on the one hand, may be looked to to augment these figures, and others which would detract from them. Of evidence under the second head, none has been offered.

In two reports four of the patient's relatives were cancerous, and this is the largest number. Another instance has been communicated to the editor, of a family where of 7 children, 6 died of cancer,—the men of cancer of the digestive organs, the women of cancer of the breast. Such evidence, which, if attainable would be more conclusive than any other, is perhaps not to be expected. A family with such a curse, or so susceptible to the disease, must rapidly disappear. The editor comes to the conclusion that a comparison of the evidence of the influence of inheritance with that of other causes, exciting or predisposing, shows a balance largely in favor of inheritance. The predisposition of the breast and uterus to cancer is certain; yet not more than 1 in 50 (2 per cent.) of adult women die of cancer of these organs. Gross shows only 11.7 per cent. attributed the disease to injury. The Inquiry shows 20.6 per cent. in the direct line of descent; or from fathers and mothers only, no less than 16.84 per cent.

On the question of influence of *diet* on the occurrence of cancer, the returns to the Inquiry furnish no definite answer. "The history of the diet of these persons all goes to show that they were moderate in food generally, and particularly moderate in partaking of animal food and stimulants. But neither a very small allowance of meat nor total abstinence from stimulants sufficed to protect them from the disease.

"The question of *locality* is in many respects the most difficult to trace by the method of collective investigation." To be reliable, it must be complete and thorough; and this inquiry not being compulsory, was necessarily imperfect. Although the returns show that 136 cases were dwellers in towns and 70 from the country, from many circumstances it is probable that this statement does not represent the true disproportion in the numbers. Again, the dwellers in valleys and those on hills are about equal. But this statement is misleading, since the hill may be at a low elevation compared to the valley on the hills and mountains. In the returns there is but a single instance of cancer in a resident more than 1000 feet above the sea-level. The question of locality is most intimately connected with that of the soil, not merely of the surface, but of the subsoil and underlying rock formation. It is interesting to note that the returns corroborate in general Haviland's observations.¹²

Treatment.—The question of the curability of cancer by operation is discussed very ably and interestingly by Dr. Shrady. His chief reliance is on the non-constitutional origin of the disease and the early removal of the local development. Dissemination is only secondary. The array of facts which he brings forward in favor of local origin, together with the invariable exceptions to the rule, would seem to be interpreted more fairly by the conclusion that the malady is sometimes constitutional or general, and at others local or accidental. This twofold interpretation of the data enables us to account for many features otherwise unexplainable. For example, why identical blows or other irritations are not invariably followed by cancerous developments, and why the extirpation of the local tumor is in many cases seen to cure the disease. It is conceivable that a malady, which in one instance *is* and in another instance *is not* preceded by altered tissue conditions, *should be* caused by a blow in one patient and *should not* follow an identical blow in another patient. On the same supposition, it is conceivable that extirpation succeeds in one case and not in another, even when the operation is carried out at the same stage of development and with the same thoroughness. This double supposition will not harmonize well with the theories of inherited influences, either of the constitutional or general sort, or those inherited tendencies of a locality of which Dr. Shrady speaks. To make harmony it seems necessary to discard almost entirely the notions of inheritance. Shrady speaks of the very limited influence of this factor in the causation of the disease, since it is the “exception for more than one member of a family to become the victim of cancer.” The tendency to recur can be based as much on the local as the constitutional theory. But that “the cachexia is evidently caused by the involvement of one or more vital organs” is not so evident as the author assumes. Would not most observers prefer to attribute cachexia to blood changes and failing nutrition in cancerous affections as well as in other maladies? The author’s statistics from his own work and from that of others is strongly arrayed to prove the advisability of operation, to show its beneficial influence and its power to cure in a large number of cases, and his statements are none too strong. The following conclusions are offered by him: (1) Cancer is essentially a local disease, and can be cured by operation in spite of recurrence. (2)

Operation, when it does not cure, prolongs life and diminishes the total amount of suffering. (3) Operations should be repeated as often as there is any chance of entirely removing recurrent growths. (4) The earlier and the more thoroughly the operation is performed the better. (5) The disease, when it recurs, is generally of a milder type than the original growth, less painful and less exhausting. (6) Antiseptic surgery makes more radical operations possible, with better ultimate results, than formerly obtained.

M. Reclus,¹³ apropos of five cases of malignant tumor of the mamma received into his wards at the Hotel-Dieu, speaks of the contra-indications to operations in these tumors. Alluding to the variety of opinions, there are those who believe that all surgical intervention is harmful; others, that it is useful; and still others who think that operation at times hastens the recurrence and in other instances cures the malady. Every one agrees that in generalized cancer no expectation of cure is to be held, but even in these cases palliative operations are often forced upon the surgeon. The lecturer considers that it is not proper to attempt operation when the growth has invaded the pectoral muscle, when adhesions to the walls of the thorax have taken place, when the skin is invaded as well as the axillary glands. He points out the distinction between the actual invasion of the skin and the mere adherence of it to the tumor; the former causes the appearance known as orange skin, and the latter produces redness, depression, and finally ulceration. Another contra-indication to operation is the condition named by Velpeau pustulous cancer, where numerous shot-like bodies are felt in the skin: this condition is rapidly followed by recurrence after operation. The same rule applies to the condition known as cancer *en cuirasse*. When merely the pectoral and perhaps the axillary glands are involved, it is possible to remove them all; but the invasion of the clavicular glands removes from us this hope, and no operation should be attempted. Atrophic scirrhus of the breast also comes within the class of cases having contra-indications to operation. Such tumors have been known to exist for 20 years without spreading or impairing the health of the patient. One case is cited lasting from the age of 45 to 87, and although the mammary gland was destroyed and also the pectoral muscle, the patient was in fair vigor. There are some general conditions which prevent operation, such as marked cachexia,

albuminuria, glycosuria, etc. Old age is not in itself a reason for abstaining from operation. The mortality from the operation shows on an average 15 or 16 deaths per hundred, while the gain to the duration of life is 11 months in favor of the operation.

Paget¹¹ hopes that *when* the micro-parasitic cause has been found, a specific may be discovered against it, such as quinine for ague. But the history of medicine does not lead us to aspire in this direction. The specifics for disease, so far as they exist, have come before, not after the recognition of the cause; especially is this true of micro-parasitic causes. The discovery of the microbe has not helped forward the *treatment* of any disease, not even the traumatic infective maladies. We prevent wound infection not by destroying the organisms. Cleanliness and exclusion serve. But we have not added to our power of cure of the developed malady, since the micro-organism discovery. We cannot destroy the organisms, nor produce cleanliness, within our bodies, by new means nor with better means than previously. Prevention of cancer and cancerous diseases, by destroying the not ubiquitous, but not to be found micro-parasite is a task the clue of which is not ready to be taken up, since the disease is not contagious.

SARCOMA.

S. W. Gross,¹⁵ of Philadelphia, gives a most valued addition to our knowledge of sarcoma of the mammary gland. This paper supplements, with large additions, the chapter on this subject in his treatise.¹⁶ That chapter was then, and it remains to-day, the best account of the subject to be found in surgical literature. The statistics of the present paper, together with the general pathology and life-history of these growths, are taken from the records of more than two-and-a-half times the number of cases. What makes Prof. Gross' records especially reliable is that, not only for his own cases, but in those of other surgeons, the progress of the patients in many instances has been followed to the final result, often into periods long subsequent to that given in the published account. He gives the results of his observations of the three varieties of growths, viz., the spindle-celled, including fibrous, of which 68 per cent. occurred; the round-celled with 27 per cent.; and the giant-celled, 5 per cent. of all these cases. The subvarieties are constituted by the nature and arrangement of the intercellular

substance, by various transformation or combinations with other neoplastic tissues, by ducts or retention cysts, and by the persistence of glandular elements. Hence the fibrous, lymphoid, alveolar, myxomatous, cartilaginous, osteoid, calcifying, melanotic, telangiectatic, hæmorrhagic, cystoid, solid, cystic, and adenoid. Of these 50 per cent. are cystic, either barren or proliferous; 33 per cent. are adenoid, principally in the spindle variety; 12.80 per cent. are myxomatous; 7 per cent. show the vascular influences; 7 per cent. are cystoid, thus giving an increased preponderance toward the cyst formation; the other subvarieties showing 1 or 2 per cent. each.

The lucid description of the appearances and consistence of the different varieties of these tumors, derived from their external examination, places one almost at the patient's bedside, and the close and accurate correlation, which the author gives, of the external features with the internal conditions and the minute structure will enable the experienced observer to make a microscopic diagnosis, with great approach to certainty, from the clinical history and macroscopic features of these growths. No description could be more picturesque or accurate than the following. Speaking of the gross characters of the smaller tumors (adenoid sarcomata of Billroth) and their differential diagnosis from fibromata, he says: "Thus, of the five specimens of adenoid spindle-celled growths which I have extirpated, all were lobulated, firm, elastic, adherent to the gland, grayish-white in color, and tough on section. The fibromata, on the other hand, were hard, merely nodular, less adherent to the mamma, white, more compact, and tough on section. Under the microscope, the glandular elements were undergoing obliteration to a greater extent in the former than in the latter." Inflammation and suppuration are infrequent. Ulceration is common, though not so markedly as in carcinoma, but double that of fibroma. These ulcers possess striking, almost characteristic features. They come more through gangrene or rupture of the attenuated skin rather than from infiltration of sarcomatous cells, and the area soon shows a fungation, not the crater-like excavation of carcinoma. These tumors are generally solitary (only ten multiple instances among the 156); generally seated in the vicinity of the nipple, and when in the circumference usually in the upper and outer part of the gland; cystic, when of central origin, solid in the outlying lobules. The growth soon extends

beyond its capsule, invading the entire gland and the surrounding, giving rise to broad-based hemispherical masses, but now and then pedunculated. In respect to the age, only 4 came before 16 or the developmental year, while 77 after 40, or during the functional decline,—leaving 67 cases out of 148 between the 16th and 40th years. Spindle-celled tumors come earlier in life. 14 out of 15 sarcomata occurring before the age of 20 were spindle-celled. “Unlike cystic and solid fibromata, cystic sarcomata appear earlier than the solid. Hence it may be said that spindle and cystic sarcomata are metaplasias of the functionally perfect mamma, and round-celled, giant-celled, and solid are metaplasias of the declining gland.”

“These facts show that the etiology is most obscure, since their development is rarely traceable to injury or disease, and is not influenced by hereditary predisposition; while social state and menstrual irregularities or arrest are surely unimportant agents in their production.” Their increase is more rapid, of course, than other connective tissue neoplasms, but shows great diversity, independently of age, influenced by their structure, by their degenerations, and by cyst formation. Solid sarcomata are sometimes large, but it is myxomatous degeneration and softening cysts which make the enormous dimensions. Cystic often remain small, afterwards starting up to attain larger sizes, but showing very unequal rates of progress, while long periods of quiescence and intermission are not infrequent. “Continuous growth rather indicates freedom from cysts and vegetations, while sudden and rapid increase points to fluid accumulation and intercanalicular vegetation.” Menstruation, pregnancy, or lactation—conditions naturally expected to render the gland more vascular—seem to have no such influence as has been assumed by certain authors; and the effect is not confirmed by an analysis of these cases. “The active growth is liable to be attended with marked elevation of temperature. These tumors were highly vascular and composed of small cells, so that elevation of temperature may be said to be characteristic of telangiectatic and rapidly proliferating growths. Further investigations in this direction may prove useful in determining the differential diagnosis of connective tissue neoplasms, and should not be neglected.” During their growth they continue, as a rule, mobile and free from superficial or deep attachments; the skin

natural in color and texture; the veins not enlarged; the nipple normal; the associated lymphatics uncontaminated. Recurrent tumors not uncommonly become fixed to the muscle and the chest wall, while the primary growths leave these parts as well as the integument free. The skin may become adherent, but the microscope does not show that it is infiltrated. Although the skin is not infiltrated, it changes color in some instances, as shown in 36 cases. The veins were enlarged in 24 cases, and the nipple 5 times; in 19 cases the lymphatics were enlarged or tender, but in only three instances were the tumor elements detected in them (one a primary alveolar, pigmented, round-celled, the others recurrent growths, one from a round-celled, the second from an alveolar giant-celled tumor); the immunity of the glands is remarkable, and the figures show that it is the result of an irritative hyperplasia. Pain attended about one-third of these cases, absolute tenderness in very few, but annoyance from weight and bulk was very frequent. Sarcomata often grow through their capsules and invade the surrounding tissues in mass, but even while the capsule remains intact a small-celled proliferation takes place along the course of the blood-vessels, forming "the latent zones of infection," which are not readily appreciable to the eye, but serve as points of departure of the recurrences and the foci of general infection. "Hence it is that the prognosis of sarcomata is eminently unfavorable, although there is still no little diversity of opinion among practical surgeons and pathologists on this point." The malignant attributes of sarcomata, "as denoted by their capability of reproducing themselves, not only in the neighboring tissues, but also in remote parts," Gross certainly established in 1880 for all varieties of sarcoma. Among 91 of the 156 cases, in which the history was followed, 32 remained well for periods of considerable length, 42 exhibited local recurrence, and the remainder showed metastases. "In other words, 64.83 per cent. of these cases were endowed with malignant features." The histological constitution of the growth exerts a marked influence upon the date of recurrence, and the prognosis is materially influenced by the age of the patient and by the size and rate of increase of the tumor. "It does not appear, however, as many writers assert, that the more tender the age the more rapid the growth of, and the more malignant the neoplasm. After 35, the danger increases with advancing age,

In other words, a sarcoma occurring in a functionally active breast evinces a marked disposition to recur after the operation, with less disposition to metastasis; while a sarcoma of the declining breast recurs less frequently, but is generalized in a greater number of instances." While the round-celled are the most malignant, the metastasis of the spindle-celled is not to be denied, nor can we say that the cystic variety is an innocent tumor, or one of limited malignancy, since it recurs in more than one-half of all the cases, and generalizes itself in about one case out of every nine."

Here is Gross' table of comparison of many important features of sarcoma and carcinoma:—

	SARCOMA.	CARCINOMA.
Invasion of skin by tumor elements, . . .	9.67 per cent.	68.92 per cent.
Invasion of chest walls, . . .	3.87 "	21.58 "
Primary invasion of axillary glands, . . .	0.64 "	67.35 "
Local reproduction after removal, . . .	58.24 "	80.97 "
Metastases found post-mortem, . . .	60.00 "	50.00 "
Average duration of life, . . .	81 months.	39 months.
Permanent cures, . . .	13.18 per cent.	10.39 per cent.

Cristiani¹⁷ states that it is not remarkable that the mode of invasion of sarcomata should vary, since the pathological histology of these tumors is itself so divergent. Certain tumors of this class behave toward the surrounding tissues almost as benign growths. Thus, in two cases of fibro-sarcoma and in one of ossifying sarcoma, a portion of the new elements had evolved in certain parts a form of adult connective tissue, while in the remainder the usual embryonal cells appeared in considerable numbers. The muscular fibres involved by these growths showed no special alterations; the muscle was atrophied, the pale fibres reduced, but the muscular nuclei showed no evidence of reactive changes. The more rapid growths, such as frequently occur in the mamma, show their greater malignancy by possessing only embryonal cellular elements. Between these two extremes can be found all varieties in the form and stage of development of the cell; spindle-shaped elements are often found in connection with sarcoma originating in bone.

In sarcomatous tumors of the breast, at the stage of complete development, they are usually composed of cells of rounded form, although in places an ovoid outline is assumed in consequence of mutual pressure. In the area of the muscle, after complete invasion of the tumor, the appearances presented are nearly similar, masses of rounded cells almost without intercellular substance. On the boundary line between the tumor and muscular fibres the

space becomes filled with sarcomatous cells, the muscle is gradually surrounded by them, interfibrillar spaces are invaded, and before the pressure augmented by their presence is apparently sufficient to account for it, the fibres lose their striation, waste, the muscular corpuscles in the sarcolemma swell and increase in number, while muscular substance becomes granular. In parts moderately removed from the tumor, where the muscle appears to the eye normal and the fibres are unchanged, the microscope reveals evidences of invasion. These changes are especially conspicuous around the vascular trunks and between the secondary fasciculi of the muscle. These parts exhibit very numerous embryonal cells. From here the cells advance into the surrounding muscular or connective tissue, even at remote points just as it originally did from the primary growth. This process explains the rapid extension of these tumors,—a growth along the line of the vessels, but extravascular and not metastatic,—a growth rapid because on the line of least resistance. As these cells advance toward the muscular tissue the interstitial and parenchymatous alterations are exhibited, as already described, and whilst the substance of the fibre degenerates, the nuclei of the fibre present an undoubted increase both in size and number. The contractile substance is diminished by the double fact of the diminution of the fibre from degeneration accompanied by an augmentation of the volume and the number of the muscular nuclei. The plates (*champs*) of Cohnheim are no longer visible. The muscular substance is in places granular, but the sarcolemma does not present any alteration. The more closely the new formation is approached, the more intimately pressed together are the new cells and the muscular fibres, until at last it becomes difficult to say precisely what happens to the remnant of the fibre. It seems that the sarcolemma disappears and lets free the elements which it contains. But it is not possible to affirm positively whether the new elements furnished by the muscular corpuscles disappear, as do the other parts of the fibre, or become sarcomatous cells.

Waldeyer, Weber, Popper, Sokolow and others affirm that such is the destiny of the muscular nuclei, and that they furnish a proportion of the sarcomatous cells of the new formation. The evidence is convincing that the muscular nuclei abundantly proliferate in the parts adjacent to a sarcomatous tumor, and so numerously that the fibres may be completely filled. These

elements evidently of muscular origin, which are present within the sarcolemma, closely resemble the cells of the tumor, outside the sarcolemma, and when this envelope disappears, as it does later, there is nothing to distinguish the one cell from the other. The fact that the muscular corpuscles become embryonal cells does not signify that they become sarcomatous cells. When a muscle becomes inflamed from the action of an irritant, its nuclei proliferate and revert to the embryonic state. When a sarcoma acts on a muscle a similar proliferation of the muscular nuclei results as an expression of this irritation. But when the irritant is not a sarcoma, no one thinks of the cells which are formed within the sarcolemma as sarcomatous cells. Why should this be affirmed of them when the irritant is a sarcoma? In the case of the simple irritant these cells are destroyed or return to their primitive condition. It is probably also the same in the case of the sarcoma.

Sokolow, after failing to demonstrate the destiny of the muscular nuclei in sarcomatous growths of the round-celled variety, turned his studies to the spindle-celled forms. In examining three cases of this type, he found some of the fibres having spindle cells in their interior, although the greater part of them showed only atrophy and their nuclei presented no alterations to be remarked. These facts would seem to support the hypothesis that the muscular nuclei are transformed into sarcomatous cells. These observations of Sokolow seem to prove too much, and do not demonstrate the point at issue. This question of development can only be studied at the periphery of the growth where the new growth is extending into the muscle. Now, at this part, the spindle-celled growths do not exhibit spindle cells. It is only at their central portions that the fully developed spindle cell is seen; while in the periphery, where the tumor invades the muscle, the embryonal cells only are seen. These cells may have irregular shapes, but they are not spindles until fully developed at a later stage. The spindle shape or fusiform, described by Sokolow, may be accounted for by the peculiar aspect which the muscular nuclei often assume under many other circumstances, or even by the pressure of the new growth, rather than warrant the fact, as demonstrated, that these nuclei are transformed into genuine sarcomatous cells. Cristiani concludes that in some sarcomata, especially those of the spindle-celled variety, the muscle generally disappears

by simple atrophy, as the result of the compression exercised by the tumor. In the soft variety, with small round cells, the muscular fibre actively manifests a cellular proliferation, at first in the interstitial tissue and later in the muscular fibre itself. The sarcolemma disappears and the proliferating muscular nuclei are set free. But it has not been demonstrated, even after abundant research, that the freed nuclei ever transform themselves into sarcomatous elements. On the other hand, it is probable that they perish.

FIBROMATA.

Prof. Gross¹⁸ contributes a paper on fibromata of the mamma, which he defines as neoplasms composed of hyperplastic connective tissue, in which normal or variously altered pre-existing acini and ducts are sparingly interspersed. These tumors have received such a variety of names from authors as to make their recognition difficult. The nomenclature synonymous with fibroma has been carefully studied and arranged, and the long list is of great value.

Fibromata are defined as circumscribed, rounded or lobulated growths, usually of firm and elastic consistence, except when cysts are present, and then they become soft and fluctuating over these projections. On section, dry, opaquely white, dense, and crying under the knife, this surface showing a concentric arrangement with "centres which project above the level." These growths show microscopically "that they are composed of dense bundles of mature fibrous tissue, which is almost or entirely devoid of corpuscles, and that the small projections correspond to ducts and acini." This type was formerly called fibroid or dermoid. In other specimens the fibres are wavy and interlacing, and these are more juicy, and with a glistening white or even rose tint, and such growths represent the majority of fibromata. In rapidly growing examples the minute structure is that of recent connective tissue abounding in cellular elements.

"The determination of fibroma depends upon the predominance of fibrous tissue over the pre-existing glandular structures. It is very rare to find glandular elements entirely absent, but when present they must be subordinate to constitute a fibroma. When they are newly formed and preponderate over the fibrous constituent of the tumor, the latter is an adenoma." This description is very concise, but yet perfectly accurate and all-sufficient for the recog-

dition of mammary fibromata. Still, the editor thinks that many observers would desire a modification of the statement concerning some points of their microscopic structure, not so much that they differ from Gross, as to the actual appearances, but rather in the interpretation of the conditions found. Gross' account is so concise that a fuller deliverance on his part would show entire agreement. His statement that the bundles of fibrous tissue are arranged concentrically around projecting centres, which centres correspond to ducts and acini, seems to indicate that the ducts and acini furnish the point of departure of the fibrous growth; whereas the new growth of cells from which the fibres develop is seen



FIG. 1.

around the blood-vessels, not around the ducts or acini. This appearance is typically to be noted in fibroma devoid of gland tissue, but it is also conspicuous in the region of the acini. This consideration does not controvert the fact that ducts project from the centres of the concentrically arranged fibres, as seen on the cut surfaces of the tumor. And again, also, the recognition of rapidly growing tumors is not to be made by the minute structure

showing recent connective tissue abounding in cellular elements, but by the presence of the cellular areas just spoken of. When numerous and wide areas of nuclei are found around the blood-vessels, interspersed in mature fibrous tissue, it is characteristic of a fibroma which is rapidly growing. Again, the full statement is that the recognition of fibroma depends upon, not strictly the predominance of the fibrous tissue over the pre-existing glandular elements,—else this condition could be found in scar tissue,—but on the fact that there has been a new growth of fibrous tissue, and that this growth has started from a centre, composed originally of nuclear corpuscles poured out around a vascular tube. In the later stages of maturity the vascular and cell structures nearly or entirely

disappear. From the same point of view, by strict definition, an adenoma is not merely preponderance of the glandular structures, although this is the picture usually seen microscopically, but is a development, an actual new growth of ducts or acini, or both. With this growth there may be a growth of fibrous tissue, and there is almost constantly a degree of hyperplasia of the surrounding connective tissue. The former may be named, fibro-adenoma: to the latter no attention need be paid, as it is simply a reactive effect.

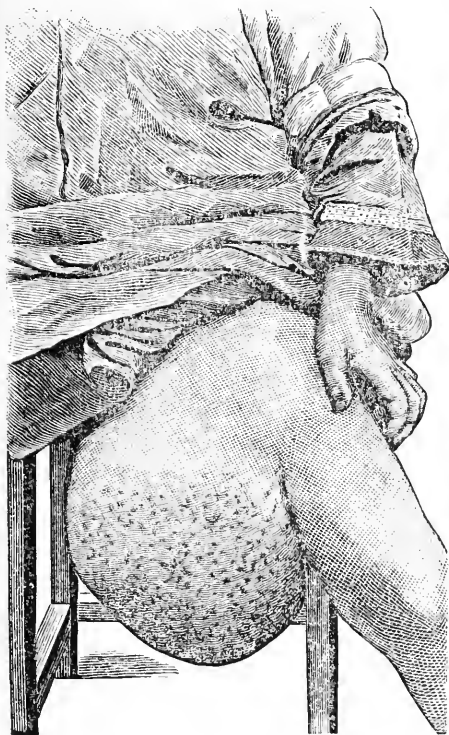


FIG. 2.

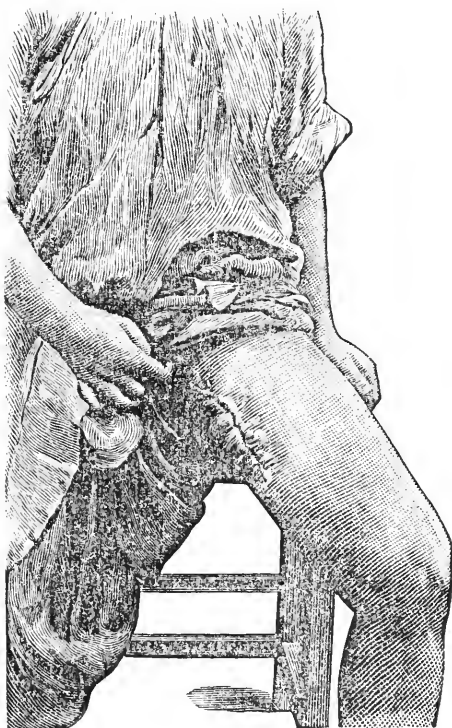


FIG. 3.

Of the drawings introduced, the fibroma picture,¹⁹ showing a duct cut transversely in the midst of the fibrillar tissue, seems to have the epithelium lining too abundant for a duct, which, judged by the other features, is greatly distended. In distended ducts the epithelium at such a stage of distension usually atrophies, or when intracanalicular growths come, this is not the pattern they show. The epithelium is unlike both irritative hyperplasia and intertubular growth. The adenoma picture does not show any part that can be distinctly pointed to as representative of a new out-

growth of glandular structure. There are, of course, many parts in adenomata as here pictured; but these regular formations do not show the distinguishing characteristic part, and the cells are too typical. This latter fact is a fault in others of Formad's drawings. The other clinical features of these growths are fully and very interestingly given, and the simplicity of the diagnosis, except between cystic fibromata and cystic sarcomata, is very clearly shown. For treatment, Gross always pursues the plan of removal or enucleation, and on very just grounds. Every tumor is a source of dread to the patient, and these growths are liable, as he has elsewhere pointed out, to be transformed into sarcoma and carcinoma.

ENCHONDROMA.

Dr. H. T. Whitney, our Correspondent of Foo-Chow, China, kindly furnishes some interesting illustrations of Oriental tumors

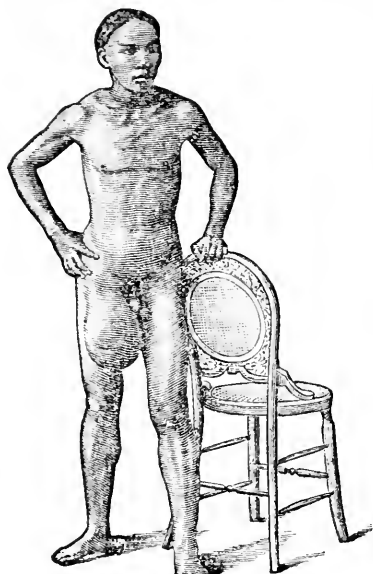


FIG. 1.

as seen among the Chinese. The accompanying figure (Fig. 1) represents an enchondroma of the femur having a weight of about 70 pounds. Such tumors are not rare growths with us, and the records of any large hospital will show instances of them in the course of every few years. But the great proportions are rarely seen. These tumors are of mixed characters. The enchondroma becomes cystic before it reaches this size and myxomatous areas add to its bulk. Sarcomatous new formations attend its progress. It frequently starts at the epiphyseal junction in the femur, and raises up the periosteum, pushing it before its protrusion, and thus is often

covered with ossific plates, which are also not absent in its interior.

ELEPHANTIASIS.

The accompanying cuts are representations of patients affected with elephantiasis-arabum. Fig. 2 shows a tumor growing on the inner aspect of the left thigh. The tumor was found

after removal to weigh 18 pounds. Fig. 3 shows the limb after the operation, and the cicatrix clearly indicates that the vulva was not implicated and was not the point of its origin.

Fig. 4 represents a man with an elephantoid growth in the right groin. The tumor had a weight of about 20 pounds, and the letter of Dr. Whitney, accompanying the picture, states that the inguinal gland was in the centre of the tumor and apparently its point of departure.

Fig. 5 presents one of those enormous elephantoid tumors of the scrotum. The mass weighed 96 pounds. The picture recalls the memory very vividly of the drawing in the Wistar and



FIG. 5.

Horner Museum of the University of Pennsylvania, which students were wont to gaze at with vague wonder and unbelief.

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VENEREAL DISEASES.

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GONORRHOEA.

Pathology.—The question of the pathology of gonorrhœa has attracted much attention within the last few years, and the chronic variety in particular is the one to which special care has been devoted. Oberländer¹ claims that every catarrh of urethral mucous membranes has two sources from which the secretions are derived. Either the catarrh affects the muciparous glands alone, or the entire mucous membrane may participate in the inflammation, or else both glands and mucous membrane may simultaneously be affected. Such is the case in chronic gonorrhœa. It may be divided into the following varieties:—

(1) *Catarrh of the Mucous Membrane*,—the true mucous catarrh, which gives rise to chronic urethral discharges. Here there is no infiltration of the glands. The mucous membrane is highly inflamed, of a velvety appearance, and is no longer transparent. No vessels can be detected, and the longitudinal fold which normally is present in the urethra no longer exists. (2) *Urethritis Mucosa Hypertrophica*.—This is a dry catarrh and is more circumscribed. The mucous membrane is less swollen and the natural longitudinal folds are yet visible. The mucous membrane is less glistening in appearance and non-transparent. There is no velvety swelling and the color is either of a bright or dark red. [An abstract of the paper with colored plate, will be found on page 212 of this volume.]

As regards the seat of gonorrhœa in the female, great difference of opinion prevails. Zeissl, in 100 cases of gonorrhœa only found 6 where the infection was seated in the vagina; while Lewin found

the urethra the seat of the infection in 8 out of 244 cases. Sigmund found 8 cases of urethral gonorrhœa in 758 women. It was associated 476 times, however, with other venereal affections. He examined 57 prostitutes with a view to determining the location of gonorrhœa. Of these, 34 had recent gonorrhœa and 3 gonorrhœa of from three to five months duration. In these cases the secretions were examined for gonococci, which he regards as pathognomonic of gonorrhœa. His conclusions are as follow:—

(1) In all cases of gonorrhœa the urethra is involved; then in a large proportion of cases (4 to 7 per cent.) the mucous membrane of the cervix, and in quite a number of the cases the mucous membrane of the uterus, and occasionally the vulvo-vaginal glands. (2) In all cases of recent gonorrhœa a gonorrhœal urethritis is present. Even if the secretion be scanty, it still contains gonococci. (3) A long time after the disappearance of the gonococci from the urethral discharge they may still be found in the cervix and body of the uterus. (4) The gonococci do not settle upon the mucous membrane of the vagina or vulva. When found in the vaginal discharge, they have been conveyed from the neighboring diseased mucous membrane.

Schwartz³ considers that gonorrhœa in women is not only one of the most frequent diseases, but also one of the most important, on account of its extension to the uterus, the Fallopian tubes, the ovaries and the peritoneum. He considers that it is never entirely cured. A certain proportion of women afflicted with gonorrhœa die from puerperal peritonitis, renal disturbance, or tuberculosis and amyloid degeneration. Gonorrhœa is the only contagious catarrh of the female genital organs; the more numerous the gonococci, the more easy the infection. Secretions which are free from gonococci, as in chronic gonorrhœal discharges, are no longer contagious. In women the gonorrhœa often begins in an acute form. More frequently, however, it may commence as a chronic affection. If the discharge extends to the uterus and its annexes, fever with pain in the pelvis and small of the back are always present. From the presence of gonococci in the vaginal walls, Schwartz believes that a gonorrhœal vaginitis is present. The most important symptoms of chronic gonorrhœal infection are disturbances of menstruation, relapsing peritonitis and sterility.

Exception to these statements may fairly be taken. Many

women have or have had gonorrhœa who do not suffer from the symptoms which Schwartz lays down, and certainly it never produces the disturbances and fatal terminations to which he alludes, under the head of peritonitis, nephritis, and tuberculosis with amyloid degenerations.

Sinclair⁴ considers that gonorrhœa in the female has been strangely neglected as regards treatment. He considers that it may cause chronic discharges, metritis, endometritis, salpingitis and pyosalpingitis, ovaritis, peritonitis, derangements of menstruation and sterility, together with a variety of other complications which are not necessarily dependent upon the gonorrhœa. He considers that if gonococci are present in the discharge from an inflamed mucous membrane, the discharge is always of a gonorrhœal origin. He admits, however, that exceptions to this rule sometimes exist, and that a secretion containing gonococci, whenever brought in contact with a mucous membrane which is capable of infection, gives rise with certainty to a gonorrhœal inflammation in that membrane; but if no gonococci are present, then there is no gonorrhœa. He divides the clinical phenomena of the disease under the two heads of acute and chronic. In the acute form the urethral variety never occurs when other portions of the genital tract become involved; but the converse proposition he holds is not true. In every stage there is a peculiar reddening near the orifices of the ducts of the vulvo-vaginal glands which he considers as a suitable soil for the development of the gonococci. Gonorrhœa of the cervix he considers as the rule and not the exception.

The acute form usually extends into the cavity of the uterus. This process takes, as a rule, from two to three months, while it may still be considered in the acute stage; and even if the external symptoms, urethral or vulvar, have long disappeared, the disease may still extend in the acute form into the uterus, Fallopian tubes or peritoneum.

The chronic form is principally caused by the latent gonorrhœa of the male. An external discharge is the probable, not the necessary, accompaniment of the contagious conditions in the male. Complications have also taken place in women precisely as they do in men in the shape of cystitis, diseases of the ureters and kidneys. Chronic and acute inflammations of the glands of

Bartholini also ensue as a consequence of this variety of gonorrhœa. When the Fallopian tubes and ovaries are attacked, hydrosalpingitis or pyosalpingitis occurs. Sinclair cites a case of destructive suppuration of the uterine appendages produced by an acute attack of gonorrhœa. The ovaries also are attacked, the inflammation being, for the most part, superficial. In the latter stages it may produce a variety of secondary symptoms accompanied with intolerable pain and disturbance of the functions of the organ. Abscess of the ovary as a sequel of gonorrhœa is rare. Sinclair further considers that sterility may be produced in a woman who is suffering from gonorrhœal perimetritis. It may occur in two ways: either during the first coitus after impregnation, which will end in abortion, or else after pregnancy has gone on to full term, inducing peritonitis with perimetritis. In rare cases the gonorrhœal infection, while setting up a perimetritis, may not prevent the woman from bearing children subsequently. Thorburn,⁵ of Manchester, does not agree with these conclusions, considering the latent gonorrhœa of Noeggerath as mythical; and certainly as regards the question of sterility in women it may be decidedly stated that but a very small, if any, proportion of the cases occurs as a result of the gonorrhœal infection.

Etiology.—Within the last few years the parasitic origin of gonorrhœa has been claimed by many observers; and it is yet a disputed point whether the gonococcus of Neisser is the real cause of gonorrhœa in either male or female. Allen has frequently found gonococci in gonorrhœal pus, and in the mucus and watery discharges of chronic gleet. The practical value of the discovery is shown in the detection of the micro-organisms in the female, and the termination of the infected character of the discharge a long time after infection. Allen admits that the gonococcus is the *materies morbi*. Still, he waits for confirmation.

Czseri⁶ gives two cases of urethritis in boys aged 4 and 5 years, in both of whom the gonococcus of Neisser was found. In one of these cases the disease was acquired from his sister; in the other, from the boy's mother; but how, is not stated. Burchardt⁷ considers the question of the gonococcus of Neisser as established, and regards the best medium for its cultivation to be human blood serum. He states that an examination of the discharge showed that during the first stage of the disease the gonococcus settled

and multiplied upon the pavement epithelium of the fossa navicularis; but that very soon afterward it penetrated between the epithelium cells, causing them to exfoliate. They then continued their wanderings toward the papillæ, at which they apparently arrived about eighteen hours after infection. A migration of white blood corpuscles from the papillary vessels now ensued, so that the secretion which contained at first but epithelium cells and gonococci, either isolated or contained within the epithelium cells, now became sero-purulent. Later on, the gonococci entered the lymphatic spaces of the papillæ and the deeper tissues, where they rapidly multiplied; but it is only after the mucous membrane has become soaked by the imbibition of serum, and through the migration of the white blood corpuscles, that the deeper tissues absorb the gonococcus to any considerable number. In addition to its presence in urethral discharges, Smirnoff⁸ claims to have found, in the sero-purulent fluid aspirated from the knee-joint of a patient suffering from gonorrhœal urethritis, numerous groups of Neisser's gonococcus within the pus cells,—thus confirming Petrone's, Kacmmerer's and Anasieff's researches.

Zeissl⁹ considers, on the contrary, that the pathogenetic action of the gonococcus is not yet proven. While on the one hand it may be a constant occurrence in the gonorrhœal discharge, on the other hand he has found the same organism, or one presenting the same appearances, in the secretions from the urethra inflamed by mechanical or chemical irritants; and he has also found it in the secretion of a furuncle. He holds that as yet we have no absolute proof that a specific contagion is the cause of a gonorrhœa; and that, the editors believe, is the present opinion of most syphilographers. It must be borne in mind that every urethral discharge is not necessarily gonorrhœal; for it is well known that inflammation of the urethra may arise from various causes, among which the herpetic, arthritic, and strumous diathesis play an important part. To these may be added syphilis. Henry See and others have described certain urethral discharges at the inception of the disease and sometimes during the secondary period, and have given reasons for attributing to them the property of conveying syphilis. It is well known that initial lesions seated within the meatus will oftentimes give rise to a discharge which is frequently mistaken for a subacute gonorrhœa.

The strumous diathesis, according to Bazin, may excite a blenorrhœa which assumes the form of a prostatorrhœa. The herpetic diathesis may also cause a urethral discharge; but of all constitutional causes the arthritic diathesis stands first. Some writers have described purulent forms of urethritis in association with acute rheumatism. Besnier and Deligny have questioned the statement that purulent forms of urethritis have been due to this diathesis; but there is no doubt whatever that an attack of gout or rheumatism supervening after urethritis, will intensify and aggravate the urethral symptoms.

Complications.—Tommasoli¹ considers that there is no relationship between an arthritis and gonorrhœa. In the genesis of gonorrhœal rheumatism he holds that the gonorrhœa furnishes the preparatory elements, and the rheumatic diathesis the occasional or, as Tommasoli expresses it, the explosive factor.

Róna⁶ gives an interesting case of atrophy of the testicle following an acute orchitis occurring in a young man who had an orchitis without any assignable cause. After a year's duration the testicle was almost entirely atrophied, while that of the opposite side was double its natural size. After the subsidence of the acute symptoms, Frick's dressing, that is, compression, was applied; but Róna does not consider the atrophy to be due to this. Although the case is headed as one of atrophy of the testicle occurring after an acute orchitis, the editors are strongly inclined to consider it of syphilitic origin rather than an acute orchitis.

Gonorrhœa is not usually considered a fatal disease; but Post,¹⁰ in looking over the literature of gonorrhœa, was impressed with the many fatal cases recorded and the variety of ways in which a fatal termination was brought about. In the vast majority of cases it was due to some imprudence or folly on the part of the patient. Gonorrhœa confined to that portion of the urethra anterior to the compressor urethræ muscle is usually harmless. Yet even here fatal cases have been reported. Voillemaier gives the case of a man who broke a chordæ and died of purulent infection. Villeneuve reports a case where to relieve a chordæ twenty leeches were applied. An ulceration formed in two days, the corpora cavernosa were exposed for the length of three inches, purulent effusion of the left elbow-joint ensued, and the patient finally died of hæmorrhage from a slough in the penis.

When the disease passes beyond the compressor urethræ muscle, Post considers that it opens a field of great danger. Abscesses of the prostate, when the pus is discharging into the urethra, usually disappear rapidly; but not infrequently a prostatic abscess may continue indefinitely and finally prove fatal. Pittman reports a case of prostatic abscess which, with the exception of a difficulty in urination necessitating the use of the catheter, presented nothing unusual, developed a fever, and the patient died six days after admission into the hospital. On post-mortem an abscess was found between the rectum and bladder. Post himself cites two cases of prostatic abscess following gonorrhœa which terminated fatally.

Murchison reports a case of a patient with gonorrhœa who was brought to the hospital in profound coma, death ensuing three hours after entrance. On post-mortem the entire urinary passage, from the anterior portion of the urethra to the pelves of the kidneys, was found intensely inflamed, the mucous membrane covered with pus, both ureters full of pus, and the kidneys enlarged and of a deep purple hue. Two other cases, one of Murchison's and one of Delafield's, where acute gonorrhœa in the female terminated fatally, are quoted by Post. In both cases renal disease was found on post-mortem, Murchison's presenting acute nephritis and Delafield's numerous small abscesses. Peritonitis and subperitoneal phlegmon are among the possible complications of gonorrhœa. Besides these there are the remote effects of gonorrhœal inflammation which are propagated through the intervention of the vas deferens, the vesiculæ seminales, the bladder, the ureters and the kidneys. Peritonitis after inflammation of the cord has been reported by Hebra, Ricord and Fournier. Peritonitis after prostatitis is said to have been observed by Ricord. Stanley, in 1883, reported two cases in which complete motor paralysis of the lower extremities and the sphincter with a loss of sensation followed gonorrhœa. Gull believes that the so-called reflex paraplegia following gonorrhœa depends upon distinct inflammatory changes in the cord, and reports two cases.

Treatment.—The abortive treatment of gonorrhœa has been advocated by Welander⁷ on the ground that in the first two or three days after infection the gonococci do not pass beyond the epithelium of the fossa navicularis, and only after six do they enter the

lymphatic spaces. He is convinced of the possibility of aborting syphilis. His plan is, after having made the patient urinate, to briskly rub the anterior wall of the urethra with small tampons of cotton, with the idea of rubbing off the epithelial layer of the urethra, when he applies a 2 per cent solution of nitrate of silver, which is repeated on the next day.

Kreis and Goll⁸ have tested the effects of the salts of thallium on the gonococci, and found that as weak a solution as $\frac{1}{4}$ of $\frac{1}{2}$ per cent. destroyed a cluster of gonococci. They furthermore found that injections of $1\frac{1}{2}$ to 2 per cent. solution of the salts shortened the duration of gonococci from fourteen to eighteen days.

Castellan¹¹ has found the bicarbonate of soda injection to be of service in the treatment of gonorrhœa. His cases are too few, however, to be yet thoroughly convincing.

Quinine injections have also been advised by Ledsson¹² in the proportion of one part of the salt to twenty-five parts of glycerine and seventy-five parts of water. The editors' experience with quinine injections has not been very happy.

Brewer,¹³ of the Roosevelt Hospital, speaks highly of the deep injections of the bichloride of mercury, one part in from six to ten thousand of water. The injections were made twice a day, and he states that recovery in all cases took place in two weeks, the average time between seven and eight days. The editors' experience with those injections does not lead them to confirm Dr. Brewer's hopeful view. Guyon¹⁴ advises that if forcible injections be made into the urethra, they should be confined entirely to the anterior portion, as the posterior portion is sensitive and likely to be injured. It is better, as a rule, never to make a forcible injection into the urethra under any circumstances, whether into anterior or posterior portion. The safest manner, he considers, is to proceed by what he calls instillation, by means of a bougie which holds one or two drops of the medicated fluid. This bougie instillation is carried down to a point just anterior to the membranous portion, and then the fluid is allowed to run anteriorly. To prevent the immediate return of the fluid a bougie *à boule* of 20 to 21 French size is used. It is well to wash out the anterior portion of the urethra previously. Nitrate of silver in solution of from 2 to 3 per cent. strength, never stronger than 5, is the best remedy. The internal administration of sandal-wood oil is well spoken of by Latzel.¹⁵ The

former states that the oil changes the color of the gonorrhœal discharge in the early stage to a milky hue and relieves the difficulty in urination; but the best results are obtained if the drug is not given before the third or fourth week, combined with an astringent injection. It is of great value in cystitis and in gonorrhœal prostatitis. In chronic gonorrhœa it produces, in many cases, decided improvement. Posner considers that it agrees better than any other of the balsamic remedies, particularly in cases of four or five weeks' duration, and often alone suffices to cure. He differs from Latzel with regard to its efficacy in chronic gonorrhœa. The dose he recommends is from ten to twelve capsules per day, each capsule containing five drops. Lublinski and Casper both affirm the good results claimed for the drug. Taylor¹² recommends the use of the oleum gaultherii (oil of wintergreen) in recent gonorrhœal rheumatism, where the disease has been of no longer duration than three months, and reports twelve cases thus treated. The dose ordinarily given is five minims three times a day. It gave prompt relief to the pain, and satisfactory results as to ultimate cure were reached in periods varying from one month to ten weeks. He believes that it will be of the greatest benefit in recent cases where the fibrous structures of joints and muscles are not yet involved. He is of the impression that it will disappoint in cases of hydroarthrosis, and naturally in chronic cases. In acute orchitis, Pignoret¹⁷ has employed the salicylate of soda in twenty grain doses every hour with marked success. It produces a diminution of the pain in a few hours, and permits the patient to go about, leaving nothing but a slight induration of the epididymis after ten days. The same treatment was recommended by Henderson, of London, in 1881.

CHANCROID.

One of the most interesting questions in the consideration of this class of diseases is the nature and contagiousness of the chancroid or simple venereal ulcer, and its possible origin from other sources than simple chancroid or chancroidal bubo. Finger¹⁸ has instituted a series of experiments to determine whether there is any specific virus to the chancroid, and finally accepts the view that it is the product of inoculation of an irritating pus upon a sufficiently irritated skin or mucous membrane. The first series of

experiments were directed to test the effect of chemical irritants upon syphilitic persons, with the following results:—

(1) Croton oil inoculation has produced pustules and ulcers as large as a lentil, requiring eighteen days to heal. Pus taken from them and inoculated on a second person resulted in two generations of aborted pustules. Inoculation with tartar emetic and sulphuric acid had a negative result. (2) Inoculation of syphilitic persons with pus of an acute urethritis. The results were for the most part negative. The utmost that was produced was a slight abortive pustule. (3) Inoculation of syphilitic persons with non-specific pus. Against a series of negative results the pus of an acute adenitis resulted in the production of phagedenic ulcerations inoculable for generations. The inoculation of lardaceous ulceration with an erosion of a frenum resulted in two cases in the production of small non-inoculable ulcers. (4) Inoculation of syphilitic persons with syphilitic pus from papules and initial lesion resulted partly in negative and partly in positive results. In the positive results the pustules and small ulcers produced were inoculable for generations; and it is especially noteworthy that the inoculations with the diphtheritic exudations of initial lesions and mucous patches always resulted negatively, while the inoculations of ulcerating initial lesions and mucous patches afforded positive results.

The second series of experiments were inoculations upon non-syphilitic persons. (1) Inoculation with pus resulting from chemical irritation. Croton oil and tartar emetic produced abortive pustules inoculative at the utmost for two generations. (2) Inoculation with non-virulent pus. The result was to produce but transitory and slight inflammatory reaction. (3) Inoculation of the pus of acute urethritis resulted in producing redness, papules, and pustules of transitory character. (4) Inoculation with the pus of gummy products. The result was to produce no local changes with the exception of a transitory redness at the point of inoculation.

The results with these large series of inoculations which were undertaken in 1881 were by no means encouraging. Though chancres of inoculation were obtained, they were not so frequent as to permit drawing any definite conclusions from them. In general, however, Finger considered that syphilitic individuals furnished a

more favorable soil for chancres of inoculation. In 1884, Finger again took up these inoculations, but from a different standpoint. In the former experiments the inoculations were made from skin; but skin and the genitals, the natural source of venereal infection, were scarcely considered. In these subsequent inoculations the results were different; and he produced in these cases ulcerations which resembled very closely chancroids, were capable of auto-inoculation in several generations, and in one instance were attended with an acute inflammatory adenitis resulting in a bubo.

With regard to the question of diagnostic points of difference between the various venereal ulcerations, Paul Thiéry¹⁹ gives the following suggestions. He considers that the presence or absence of elastic fibres in the secretions of the chancre (initial lesion) chancroid and herpes, may be made an aid in diagnosis. He deduced from his investigation the following conclusions: That when elastic fibres are found in the scrapings, then the diagnosis would rest between the initial lesion and the chancroid, and exclude herpes. The diagnosis between the syphilitic and the simple chancres could not be positively made, yet he would incline toward the latter. When no elastic fibres are found, we have to deal with herpes or the initial lesion. Its transitory character and the absence of epithelial cells in the scrapings would readily differentiate the former from the latter; but it might also be a chancroid.

From the data given above we find that simple chancres (chancroids) which do not present elastic fibres are rare. A search for elastic fibres in the subpreputial discharges, when there is phimosis, may be of value in diagnosis. Thus in these discharges we may hesitate between blennorrhagia, herpes or simple balanoposthitis, the initial lesion of syphilis or a chancroid; but if the pus is examined microscopically and we find that it contains gonococci, then we have a blennorrhagia. If it contains no gonococci and no elastic fibres, then we have to deal with balanoposthitis or initial lesion; if it contains elastic fibres alone, we have to deal perhaps with the initial lesion, but more probably with a chancroid.

Frequency of the Chancroid.—Greenough¹² states that in France, except during the siege of Paris, in 1870 and 1871, and in 1885, during the Exposition, the chancroid had diminished in relative frequency to the initial lesion of syphilis, and that it was

more frequent in hospital than in private practice. Thus, in 1837 to 1838, Bassereau gave the proportions of chancre to the initial lesion as high as 30 to 1, at the Hospital du Midi; from 1840 to 1850 it was as 41 to 1. In Fournier's private cases it was as low as 1 to 3. Greenough gives the records of thirteen years at the Boston Dispensary as follows:—

Rate of chancreoid to other lesions as 1 to 3. In private practice rate, of chancreoid to other lesions as 1 to 10. He thought this diminution in the frequency of chancreoid perhaps may be due to a change in the type of disease, as well as to the fact that very frequently other diseases had formerly been classed as chancreoids which were now recognized as being due to other causes.

Etiology.—In common with all other venereal affections the chancreoid has been believed to be due to a parasitic origin. De Lucca^s describes colonies of micrococci in the secretions of the soft chancre. They are of a dirty yellow color, and cultivation of these micrococci and inoculations lead to the formation of typical chancreoids. The name which he gives to the microbe is micrococcus ulcerus; and he states that when these organisms reach the lymphatics they produce an ulcerating and infecting bubo.

Buboes.—When suppurating buboes occur in chancreoids they frequently lead to serious ulceration and hæmorrhage. Shield^s gives a case of suppurating bubo resulting from a chancreoid of the penis where, after the bubo was opened, sinuses were found passing behind the femoral vessels leading into a deep cavity. The cavity was sponged out, when a hæmorrhage ensued which was at first venous, but afterward arterial. On exploration it was found that perforation of the femoral artery had taken place; and although both artery and vein were tied, the patient died a few days afterward from exhaustion. Bloxam refers to two cases of hæmorrhage from a suppurating bubo, in both of which the femoral artery was perforated and death ensued from exhaustion.

Gangrene.—Gangrenous affections of the penis and lymphatics are sometimes found, due probably either to a chancreoid, or else in some cases to an injury. Bella¹⁴ speaks of an acute gangrenous affection of the glans penis where the patient, an old man, was seized eight days after a prolonged coitus with violent pains in the prepuce, which became œdematous. There were marked constitutional disturbances, and eight days after the commencement

of the trouble the patient entered the hospital with an immense gangrenous patch of the entire glans penis extending from the corona glandis to the meatus, covered by a black cuticle, on the removal of which an ulceration of large size was found covered by a diphtheritic layer. The prepuce was enormously swollen, and the inguinal glands on both sides were enlarged,—indolent on the right side and painful on the left. The ganglia were movable under the finger. Cicatrization of the ulceration took place slowly, and the patient ultimately recovered.

This affection is almost identical with the gangrenous affection of the gland described by Mauriac in 1878. It is probably caused by the action of a virulent agent upon an eroded surface in a person who is debilitated, or in one predisposed to gangrene. It usually appears in from four to eight days after coitus.

The gangrenous lymphangitis of the penis has been described by Verchère.¹⁴ It is of rare occurrence and, according to Fournier, begins spontaneously. Yet in many instances it is possible to find a plausible reason for its occurrence. Cases have been reported by Fournier, Pye and Villar, as well as by Verchère. In all of the cases reported there was a period of incubation of from eight to ten days. Contrary to Fournier's idea, he regards this gangrene not as spontaneous, but as always the consequence of a suspicious coitus. In some of the cases the coitus took place under circumstances which might give rise to excoriation. Presumably, a septic lymphangitis was the cause of the gangrene.

Treatment.—Salicylic acid has been recommended by Anglada,²⁰ who reports the results of 32 cases of chancroid treated in this manner. The following advantages are claimed. It is simple, for in the majority of cases no more than two applications are required in the 24 hours. In four or five days the ulcer loses its specific character, and then only a simple dressing need be applied; and lastly it produces hardly any pain or inconvenience. It has also been recommended by Di Bella, Hebra and Falco. Pokrowski²¹ suggests in the treatment of buboes that as soon as fluctuation is felt a deep incision should be made and the gland removed under antiseptic precautions. If a clean wound is obtained, the edges are sutured; but usually the wound is tamponed with iodoform gauze and allowed to heal, which it does in about 38 days. A substitute for iodoform has been suggested by Chassaignac, who finds the

following objections to its use: (1) On account of its odor, and (2) that when used upon a large ulcerated surface, it may be absorbed and produce toxic symptoms. He therefore advises the use of the subiodide of bismuth, which is tasteless, odorless and insoluble. When dusted upon a raw surface, it produces a thin, silvery film like that produced by nitrate of silver. It is painless and, in fact, like iodoform, is antiseptic. It has a marked healing effect upon both chancroids and chancres.

SYPHILIS.—INITIAL LESION.

Diagnosis.—Leloir gives the following points in regard to the question of diagnosis of the initial lesion: It is often rendered difficult from its insignificance, and may be mistaken for herpes. It may also be mistaken for an intertrigo, a simple balanitis or herpes vaginitis or chancroid. Sometimes, however, it is mistaken for neoplastic growth in consequence of the enormous amount of induration with which it is occasionally accompanied. This is particularly the case if the initial lesion be extra-genital, as for example when seated upon the tonsil, fingers or palpebral fissure, as occurred in a case in Fournier's service, where it was mistaken for a lachrymal fissure. On the other hand, the initial lesion may also be mistaken for other affections: (1) Syphilomata of the genitals. (2) Indurated orifices of a perivulvar abscess or abscess of the vulvo-vaginal gland. (3) Tubercular ulcerations of the tongue and penis. (4) Ulcerations resulting from arsenical poisoning; but in these cases there is no accompanying adenitis. (5) Furuncles. (6) Deep ulcerations of the balano-preputial folds resting upon true indurations. These occur in diabetic patients, Verneuil having seen quite a number of cases. (7) From the irritation produced by the *acarus scabiei*, which sometimes produce indurated ulcerations resembling the initial lesion. Leloir then goes on to consider the differential diagnosis between the chancre and the chancroid. After giving the well-known diagnostic points between the two sores, he states that the scrapings of the sore may be of a certain use in making a diagnosis. If the initial lesion is scraped, we get the débris of false membrane. In the chancroid, on the other hand, there is no epithelium: we get broad lymphatic cells, the débris of connective tissue, but no epithelial cells.

As to the diagnosis between the initial lesion and herpes, he says, seize a small initial lesion between the fingers, squeeze it as long as you please, and no more fluid can be made to exude from it than ordinarily comes. It would almost seem as if the surface were varnished over. If, on the other hand, you seize an herpetic erosion and squeeze it between the fingers, you can force a small drop of serous fluid, which is transparent and of an amber color; but on wiping this away and squeezing it again, a fresh drop will exude; and this process can be repeated frequently. As regards the diagnosis between the indurations which at times take place about non-syphilitic sores and those which occur in the initial lesion, he gives this rule: If you seize the pseudo-induration between the fingers and subject it to strong and continued pressure, its form will change: it will become flatter and the induration will become softer; whereas with the induration of the initial lesion no amount of squeezing will cause it to change its form or become softer.

Ideleon²² relates a case of Viedensky in which 3 initial lesions were seated on the first phalanx of the left forefinger: 1 was situated on the outer surface and 2 on the inner. The ulcers were indurated and shallow. There was a tender lymphatic cord extending up the axilla, and subsequent syphilitic manifestations ensued. The mode of contagion was by a boy. Two other cases of the finger were also reported by Lunkewitch, of Tiflis, and J. J. Ninkevitch. Peterson,²³ in discussing the question of extra-genital sores in general and of the initial lesion of the tonsil in particular, states that of 1208 male patients admitted to the Alexandrovski Hospital, in 23 extra-genital initial lesions were found: 11 were on the lip, 9 near the anus, 2 in the abdomen, and 1 on the cheek. In cases of labial chancre, the patients were all from 9 to 14 years of age. In the anal chancres, 7 were acquired from sodomy and 2 from sleeping in bed with syphilitic persons. The chancre of the cheek was acquired from a bite. Peterson also reports the case of a chancre of the tonsil, acquired either through the hands of a dentist or from marital kisses. Szadek²⁰ reports 3 cases of chancre of the fauces, 2 of which occurred in soldiers, aged respectively 21 and 23, and 1 in a child, aged 3 years. Tchisbriakoff, of St. Petersburg, reports a case of indurated ulcer of the right tonsil and anterior arch of the palate occurring in a shopman. Secondary symptoms followed. Several weeks prior a girl with mucous

patches on the end of her tongue had put her tongue into the patient's mouth.

Tomasheosky,²⁵ of Khiev, gives the case of an indurated ulcer of the right tonsil in a girl 15 years of age, said to have been a virgin. The mode of infection is obscure. Seveki²⁵ had met with two cases of chancre of the tonsil where infection took place through unclean Eustachian catheters. Holmes²⁶ reports the case of a chancre of the eyelid. Hazlund²⁷ reports two additional cases of initial lesion of the pharynx. Mencault⁸ gives the details of a case of initial lesion of the groin. Hérard⁸ gives a case where the initial lesion was seated at the base of the left nipple, in a man aged 63 years. A few days later the whole base of the nipple became involved, and an area of redness extended from it to the axilla, where a swollen gland could be felt. Subsequent symptoms followed in the usual time. The mode of infection in this case was the sucking of his nipple by a woman. Shield⁸ and Mitchell⁸ give two cases of initial lesion of the cheek; and Cassidy,²⁹ Drysdale¹¹ and Bloxam, cases of initial lesion of the lip. Sometimes other lesions may occur, especially those of a late stage of syphilis, which simulate initial lesions so closely as to render the diagnosis difficult. Such cases are reported by Nivet,⁸ in which the patient came under Fournier's care with two ulcers of the lip, which Fournier diagnosticated as gummata because of their multiplicity, the absence of glandular enlargement, and the history of the case.

Leloir¹² also gives instances of gummatous lesions of the genitals which simulate initial lesions. These may appear before or after secondary lesions have occurred: if after, the diagnosis is much easier than when they appear before.

Excision.—H. Gradle²⁶ gives the result of five excisions of initial lesion, in four of which no secondary symptoms made their appearance; in one a macula syphilide came on.

Induration of the Initial Lesion.—Kant,⁸ from an examination of 3300 cases, arrives at the following conclusions: (1) That indurations of the initial lesion are far less marked in women than in men. (2) The induration in women is often diffused into the tissues around and is not so circumscribed as it is in the male. (3) The typical induration with cartilaginous edges is rarely met with in women. (4) During the whole course of the ulceration in only a very small number is any induration detected.

SECONDARY SYPHILIS.

Bockhart⁷ gives the case of a girl who had mucous patches of the genitals, the anus and the tonsils, with other secondary symptoms, in whom was developed a profuse exanthema which occupied the neck, trunk and the extremities. It resembled the macular eruption, but the size of each patch varied from the size of a lentil to that of a dollar. It was not of a coppery color, but of a dark brown hue. Antisyphilitic treatment was of no avail, but after five months they assumed a paler color, becoming yellowish in hue. The dark brown color of the spots is regarded by Bockhart as being due to the change in the coloring matter of the blood, which became extravasated on account of the thrombosis of a vessel, the discolorations themselves being gradually absorbed and carried off by the cells into the papillæ, and thence through the cells of the corium into the epidermis.

A curious variety of syphilis is described by Horowitz⁸ under the title of hæmorrhagic syphilis. He gives two cases which were observed at Neumann's clinic, and calls attention to the great variety of this form of acquired syphilis in adults. In neither of these cases was there any cause for this blood extravasation. In his cases every dyscrasia, including hæmophilia, could be excluded. In regard to the cause of syphilis in subjects of hæmophilia, Horowitz mentions the case of a vigorous woman who came of a family of bleeders. She had bleeding from the nose, uterus and digestive tract, but neither the syphilitic papules nor the surrounding tissues showed any trace of hæmorrhage.

Fournier³¹ describes a lesion of the tongue which is observed in syphilitic subjects from two to four years after infection, and which shows a great tendency to relapse. This lesion presents itself in the form of an erosion, which readily disappears upon cauterization and is not influenced in the slightest degree by anti-syphilitic treatment. After much study he came to the conclusion that this is the same lesion that Doyon has described as occurring upon the genitals, which Fournier, owing to its location, has designated as herpes buccalis recidivans. The lesion is of great practical interest and has heretofore passed unnoticed. It is undoubtedly herpetic, and consists of superficial erosions or of excoriations which infect the mucous membranes, with but slight

loss of tissue. The lesions are small in size, varying from a pin's head to a lentil, multiplied and disseminated over several points on the surface of the tongue, especially the labial border and the apex. They are also ephemeral. If left undisturbed, they do not last longer than fifteen days unless irritated, rapidly disappearing under cauterization, and like herpes, they are recurrent. Through coalescence of several of these lesions, erosions develop.

As regards their color they may be either grayish or opaline when the epithelium is affected; and if deprived of this latter they are red. They are never seen as vesicles, inasmuch as the epithelium is removed shortly after their appearance. Fournier lays stress upon the analogy existing between the herpes progenerialis, described by Doyon, due to a local irritation, and herpes buccalis, in which the irritation is due to a buccal syphilide, to mercury or tobacco; and they are of interest especially as occurring in persons who are under the syphilitic diathesis.

Syphilitic Rheumatism during the Secondary Period.—Fournier³² describes the articular lesions which occur during the secondary stage of syphilis under the following heads:—

(1) Arthralgia, or articular pains without appreciable changes. (2) Subacute arthritis resembling somewhat a mild form of rheumatism. (3) Hydrarthrosis. (1) *Arthralgia*. This is characterized by pain on moving the joints, although there is no appreciable change. It is simply a functional trouble and is found in almost all the joints, more especially the scapula-humeral articulation and the knee; next in frequency the elbow, the wrist-joint and the tibio-tarsal articulation, and less commonly in the joints of the hand and feet, in the temporo-maxillary articulation and the hip-joint. One characteristic of this affection is that the pain is severer when the joint is at rest than when in action, and rather more frequently met with in women than in men. It commences at the beginning of the secondary period, and is coincident with the maculæ syphilide and the general nervous and febrile disturbance. Its duration is variable, frequently disappearing spontaneously; but in many instances it may persist for several months in untreated cases. It readily and quickly yields to mercurial treatment. (2) *Subacute Arthritis*. This is the rarest form. It is attended by both pain and disturbance of motion and the joints are slightly swollen. Sometimes even a

slight exudation may occur in the joint, which may readily pass undetected. Usually one joint is affected, sometimes two, and rarely three. Although subacute in character, it runs a febrile course. The knee is the joint which is especially attacked, the elbow, wrist-joint and tibio-tarsal articulation less so. It is not observed in the smaller joints. (3) *Hydrarthrosis*. This is more frequent than the subacute variety, and is distinguished from it by having less pain, by a greater exudation into the joint, which, however, is never very large, and by the fact that it is never attended by fever. The seat of this affection is almost exclusively in the knee-joint. The subacute form and the hydrarthrosis may leave permanent changes behind, as indicated by a grating sound on moving the joint. The duration, if left untreated, is long, but if treated it can be cut short. These lesions so closely resemble rheumatic affections that they are oftentimes regarded as simple rheumatic pains developed in syphilitic subjects.

Contagion of Secondary Syphilis.—Arthur²⁹ doubts whether syphilis is often if ever conveyed by secondary lesions. His experience as a naval surgeon afforded him opportunities for examining 33,000 men; and in only 41 of these cases was the infection due to secondary lesions. In 38 of these, mucous patches of the mouth were the supposed sources of contagion, and in 26 of them the contagion was from direct inoculation by tattooing, in 1 from vaccination, and in 2 from bites. Of the remaining 12, 5 were supposed to have become inoculated from kissing; 1 was acquired by a surgeon from vaginal examination; in 2 the observation was imperfect, and in the 4 remaining cases mediate contagion took place; 1 by means of the mouthpiece of a cornet; in 2 by means of a pipe, in 1 from drinking from a water faucet. Arthur concludes that the danger of contagion from secondary lesions is very much overrated.

TERTIARY SYPHILIS.

General Considerations.—Fournier³² divides tertiary syphilis into two groups.—the dry and the ulcerative forms. The first terminates by a cicatrix without ulceration. The surface is red, and the syphilides differ from the cutaneous papules of the secondary period in their larger size, their globular shape, and their chronic course. They may be disseminated, or circumscribed and

limited to certain portions of the body. The seats of predilection for these syphilides are the nose, forehead and the hairy border of the lips, the back, the deltoid region, forearms, neck and the dorsal surface of the hands. The ulcerative syphilides do not usually appear until after the third year, and are simply a continuation of the first form,—the non-ulcerative. They may either be single or multiple. They begin in a more insidious manner, are chronic in their course, and are very liable to relapses. Both varieties may be complicated by inflammation, erysipelas, gangrene and phagedena. The seat of predilection of the ulcerating variety is the face, especially the nose, where it resembles lupus, for which it is often mistaken, and is very destructive to the tissues. One peculiarity about these lesions is that, notwithstanding their extensive local destruction, there is very slight constitutional disturbance.

Lesion of the Skin.—Ravogli³⁴ states that syphilitic ulcers of the skin occur in the most advanced stages of the disease, are limited to certain definite regions of the body, and are very obstinate to treatment. In his opinion, the only way to prevent them is to subject the patient to a thorough treatment during the secondary stage. Klotz³⁴ calls attention to the occurrence of ulcerations of the skin from spontaneous gangrene during the last stage of syphilis, and believes that these may arise without the intervention of any gummy deposits. He considers the gangrene as probably due to endarthrititis obliterans. Moriac³⁵ calls attention to the occasional resemblance between tertiary ulcerations and the simple venereal ulcers (chaneroid), the initial lesion of syphilis. Thus, he has seen the pustulo-ulcerous lesions resemble chaneroids, and the tuberculo-gummous resemble the initial lesion of syphilis. He considers that many of these cases have been mistaken for instances of reinfection.

Lesions of the Rectum and Anal Fistulae have been noted by M. Trelat³² as occurring in two ways, either as blind fistulae not communicating with the intestine, or else as complete fistulae which open externally about the anus and internally far up into the intestines. These latter, which are quite common in persons with anorectal syphilis, do not terminate at the point above the syphiloma, but open below the lesion.

Sarcocele.—Moriac³² states that sarcocele generally appears at a late period of syphilis, when other symptoms are not abundant.

It attacks the testicle primarily, not affecting the cord, vesiculæ seminales or the prostate. It is divided into two varieties, viz., sclero-gummosus and gummo-sclerous, and is not usually dangerous as regards the general health or the sexual functions. It is very subject to relapses, and does not cause any predisposition to cancer or tuberculosis. The sclero-gummosus form is not so severe as the gummo-sclerous. As a rule, aspermatism is not the result of either form. In his opinion, it is an exception. To that view, however, exceptions may be taken, as a complete restoration of the function of the testicle does not take place in these lesions, atrophy being the result in nearly all instances.

Ulcer of the Leg.—Morel and Lavallée³² call attention to the following points of differential diagnosis between gummosus and varicose ulcers of the leg: (1) in their localization; (2) in the number of lesions; (3) in their configuration; (4) in the character of the floor of the lesion; (5) in the borders of the lesion.

Tertiary Adenopathies.—Lannois and Lemoine³⁶ state that in the secondary period of syphilis, engorgements of the subcutaneous lymphatic glands is a rule, while it is the exception in the tertiary stage. Patients in whom a simple mucous patch provokes a most manifest adenitis, may subsequently suffer from a destruction of the soft parts and a most extensive gumma of the skin without the ganglia becoming infected. When tertiary syphilis attacks the ganglia, it may not generally be admitted that it behaves like the secondary lesion. According to Lancereaux, the abdominal ganglia, particularly the prevertebral, lumbar, iliac and femoral ganglia, are most frequently affected. The trunical and mediastinal ganglia are next in frequency; and much less frequently are the affections of the mesentery ganglia and those of the extremities. According to him, lesions of the ganglia are the most important in constant affections of the tertiary period. This is contrary to the generally received idea; for most authorities coincide in the belief that tertiary affections of these glands are rather uncommon.

Precocious Gummata.—Taylor³⁷ lays down three forms of precocious gummata: (1) The general form; (2) the localized form; (3) the neurotic form. This latter in some of its forms resembles erythema nodosum. The seats of predilection are the forearm and leg; but they are also found on the arm, thighs, chest and trunk. Regarding the eruption itself, it consists of two

varieties,—the first, nodosities; the second, oral or round tumors. Contrary to Moriac's views, Taylor finds that the former are much more frequent than the latter.

Gummata of the Lip.—Désiré de Fortunet³⁸ gives the history of a case of a tumor of the lower lip which resembled epithelioma, although the patient was not aware of having had any previous symptoms of syphilis, but had at the time of examination a series of ulcerations over the clavicle, the legs, the arms and submaxillary region, besides numerous cicatrices of previous ulceration. He considers that there was no question as to the character of the disease, regarding it as an ulcerating gumma of the lip.

Frequency and Chronology.—A relatively small portion of syphilitics suffer from the tertiary stage of the disease. It is impossible to give an exact relative proportion. Rollet places it at 5 per cent., Didier at 12, and Moriac from 5 to 20 per cent.³³

Diagnosis and Prognosis.—Moriac³² says that tertiary syphilis is always serious, and in a number of cases may either cause death or produce permanent disability. A great difference exists as to its danger according to the seat of the lesion, whether external or internal. The age of the patient must also be considered in the prognosis. In old age it is always more grave, *ceteris paribus*, than at other periods of life. The chronology of this variety of syphilis he regards as extremely uncertain.

VACCINAL SYPHILIS.

Regarding the simultaneous inoculation of syphilis and vacciniæ, Fournier⁴¹ states that either syphilis alone, or syphilis and the vaccine ulcer may manifest themselves. In the first instance, the vaccinal ulcer fails to put in an appearance, and the case runs the course of syphilis by inoculation. In the second instance, the vaccinal sore appears on the fourth day, and syphilis on the average about the twenty-fifth day. The vaccinal sore runs its course in three weeks, and syphilis appears at the end of that time. If the chancre appears after the vaccinal sore runs its course, it manifests itself in a vaccinal cicatrix. If, however, the vaccinal sore is prolonged, or the syphilis appears somewhat earlier than usual, inflammatory symptoms will show themselves under the vaccinal crust, indicating that something is wrong.

TREATMENT OF SYPHILIS.

General Considerations.—The treatment of syphilis has for a long time been the subject of considerable discussion among syphilographers,—(1) as to its method, (2) as to its duration, (3) as to its efficacy.

Finger¹⁶ thinks that energetic cauterization practiced before the lapse of forty-eight hours may destroy the virus *in loco*. This view is extremely doubtful; but he adds: “Generally, we have to deal with a syphilitic initial lesion as already developed.” If possible, he recommends excision of the initial sore, but not of the enlarged inguinal gland; and if the excision is not possible, he advises that treatment be deferred until the general symptoms appear. The time intervening between the appearance of the initial sore and subsequent symptoms, he advises should be devoted to building up the patient’s constitution, so that he may resist the depressing action of the syphilis. If the symptoms have appeared, he then advises the prompt use of mercury, which he considers is best in the grave forms of the disease; and this may be employed either externally or internally. If externally, it may be used in two ways, either by injection or inunction. If internally, he recommends the tannate of mercury. He further advises the intermittent treatment, stopping when the symptoms subside, and resuming it upon the reappearance of any lesion. The length of time for treatment he assigns as from one to two years in duration. The vegetable preparations he does not consider as of much advantage in the treatment of syphilis. Milner,¹¹ in discussing the different modes of administering mercury in syphilis and the indications for their application, regards mercury as the most efficient means at our disposal. If the form of syphilis is vesicular, he advises the use of the green iodide and large doses of Donovan’s solution. If the lesions are of tubercular character, he regards inunctions of mercurial ointment as the best. In persons addicted to drink, he considers the green iodide as preferable. Neumann¹² regards the inunction with mercurial ointment as an abortive method. The expectant treatment of syphilis he does not favor; nor does he regard the extirpation of the initial lesion and inguinal glands as of any value in aborting or diminishing the intensity of subsequent symptoms.

Mannis⁷ advises the destruction of the initial lesion by

Paquelin's cautery as a method of aborting syphilis. Gerster⁴² recommends strongly the antiseptic treatment in the initial lesion of syphilis, believing that if a patient present himself with an induration before examination has taken place, or while the epidermis is still unbroken, antiseptic precautions will prevent ulceration. Caspary,¹ in discussing the prolonged use of mercury in the treatment of syphilis, calls attention to the fact that chronic and subacute mercurial intoxication may produce deep and destructive ulcerations of the intestines, and that the continuous administration of mercury is by no means devoid of danger. Carmichael,⁴³ of Dublin, and Mr. Jabez Hogg⁴³ have found the oil of turpentine of unquestionable value in obstinate syphilitic iritis,—in some cases where mercury seemed to be of little effect. The drug was administered in half drachm doses, suspended in mucilage. Hartung⁴⁵ recommends the injections of calomel held in suspension in olive oil instead of salt water, claiming to have good results. Balzer,⁴¹ following Smirnoff's directions, substituted vaseline oil for water as the excipient with apparently good results. Watraszewski recommends the use of the yellow oxide suspended in gum arabic and water as an efficient method of treatment. Szadek extols the subcutaneous injections of the iodide of potassium and sodium, especially in affections of the larynx, pharynx and œsophagus.

Kreke⁸ extols the use of subcutaneous injections of calomel. Salsotto¹ has attained very favorable results from the use of the peptonate of mercury hypodermically injected. Trzcinski favors the use of yellow oxide of mercury. Morrow²⁹ believes the hypodermic method of using mercury a decided improvement on all others from its simplicity, rapidity of action, and the development of maximum effect from the minimum amount of the drug.

Besides the hypodermic, another local method is employed, viz., by inunction. Lang¹⁶ extols the oleum cinerium, containing 20 per cent. of mercury. This is made by triturating mercury, oil and lard together. It may be used not only locally as an inunction, but also for injection into glandular enlargements.

Schadeck⁴⁶ recommends the internal administration of the oxidulated tannate of mercury in pill form, each pill containing one grain. Of these from three to five are given daily.

Gamberini,³¹ believing in the parasitic origin of syphilis, uses the carbolate of mercury internally in pill form, each pill containing

a third of a grain. Of these from two to six are employed daily by him and Sadoc¹ with great success. The latter uses it both internally and subcutaneously.

To test the action of the potassium iodide in eliminating mercury, Stuchow¹ examined the secretion of 9 patients who had been treated with 2 per cent. injections of bichloride of mercury and concluded,—(1) with the combined treatment of mercury and potassium iodide, mercury appears much later in the urine than when the former is given alone; (2) the administration of iodide of potassium before or after taking mercury diminishes the quantity of mercury in the urine; (3) potassium iodide therefore delays or checks the elimination of mercury.

Succus alterans, better known under the name of McDade's Elixir, of the efficacy of which so much has been said in the treatment of syphilis, does not find favor in the eyes of Wade,⁴⁷ who tried it upon 10 syphilitic patients, continuing the treatment for two months, during which time not a single symptom had abated in the least degree. At this time half the patients were put upon the protoiodide of mercury, $\frac{1}{6}$ of a grain 3 times daily and gradually increased, when in less than a week the more urgent symptoms had disappeared.

PROPHYLAXIS OF SYPHILIS.

Fournier,³² in a report made to the Académie de Médecine of Paris, calls attention to the danger which syphilis may work, not only among those who contract the disease in a vicious manner, but upon innocent persons. The Academy unanimously declared that it is indispensable to supervise or suppress prostitution; that the system of non-supervision of prostitutes is disastrous to the public health; that prostitution is a public danger through the dissemination of syphilis; that public solicitation on the part of prostitutes is most dangerous and should be suppressed as far as possible; and that the supervision and regulation of prostitutes should be thorough and efficient.

Finger⁴⁸ comments upon the prophylaxis of syphilis in the army and navy during war and peace, and urges the following prophylactic measures: (1) Medical examination of prostitutes and their detention, if necessary. (2) Suppression of prostitution as far as possible. (3) Legal interference with and supervision of prostitution. (4) Instruction of prostitutes by a physician with

regard to the symptoms of syphilis. (5) Strict control over and medical examination of the soldiers and sailors. (6) Enforced isolation of all syphilitic subjects. (7) Instruction of soldiers and sailors as to the symptoms and dangers of syphilis. (8) In order to prevent soldiers and sailors from frequenting houses of prostitution, that libraries and other methods to occupy their time be adopted.

The duration of the syphilogenic capacity in relation to marriage is discussed by Morrow,¹² and the conclusions he arrives at are that as regards the limit of the period of transmission from parent to offspring, experience shows nothing fixed or definite. It is agreed, however, that after a variable time, the syphilitic taint ceases to manifest itself in the offspring, and subsequent pregnancy may result in healthy children; but this period cannot be definitely fixed. In regard to the parental transmission, the influence of the mother upon the offspring is more pronounced and of longer duration than that of the father. Morrow believes that the disease may be directly inherited from the father without infection from the mother.

HEREDITARY AND CONGENITAL SYPHILIS.

Hutchinson's teeth have within the past few years attracted much attention. Later investigation since Mr. Hutchinson first broached his theory have caused the value of this symptom to be questioned as a means of diagnosis; but undoubtedly in many cases it is produced by syphilis, as is clearly shown in the case reported by Habelschwerdt.⁶ Hutchinson⁵ himself admits that notches may occur in the upper central incisor teeth resembling those found in syphilis, with which this disease has nothing to do. In these cases the notch is central; the tooth, however, is wider at its free edge than the syphilitic tooth, which always shows narrowing like a screw-driver. The tooth is hard, not craggy and worn like the syphilitic one. In one instance the pseudo-syphilitic notching was hereditary, the mother being similarly affected: in this instance there was no history of syphilis, nor did the condition resemble those found in mercurial teeth.

Micro-organisms as a Cause of Inherited Syphilis.—Within a few years it has been claimed that inherited syphilis, like the acquired type, was probably due to the existence of a parasite which was christened the streptococcus. Dautrelepont discovered

staphylococci, between the horny layer of the epidermis and the rete mucosum, in the pupils removed from an infant fourteen days after death. These parasites were particularly abundant in the hair, follicles and ducts of the sebaceous glands. The blood-vessels were, for the most part, free from the cocci; but in the few which contained them the streptococci were seen between the corpuscles. The lymphatic channels were blocked with the micro-organisms, some of them being grouped around the sweat glands and between the muscular fibres. Doutrelepon does not consider that the streptococci have any relation to the syphilitic process, but that their presence is due to a septic infection which the cutaneous and mucous lesions of syphilis render possible.

Chotzen⁵⁰ found that the streptococci, which were regarded by Kazowitz and Hochsinger as peculiar to hereditary syphilis, were also found on post-mortem examinations in the bodies of persons entirely free from syphilis.

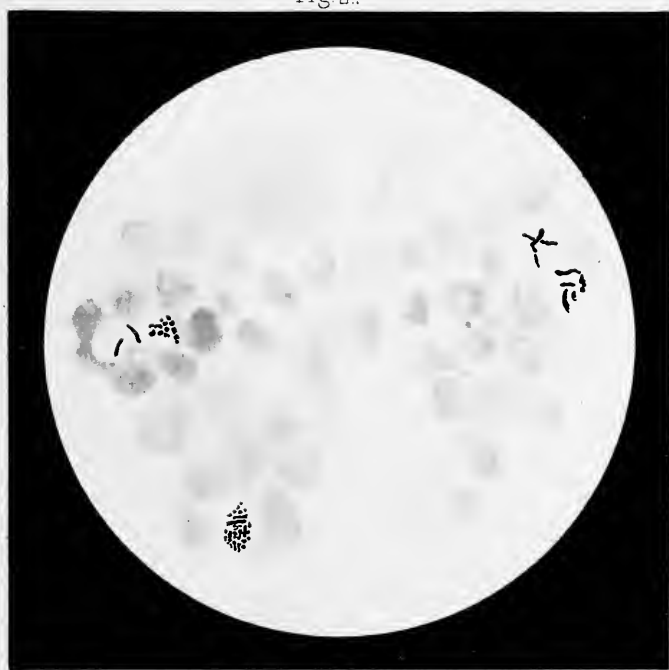
Late Hereditary Syphilis.—Reff,¹ while discussing the question whether a late form of hereditary syphilis rarely occurs, formulates the following propositions: (1) many of the cases reported rest upon faulty observation; (2) acquired syphilis is by no means rare in childhood; (3) children with hereditary syphilis rarely survive the first year; (4) it is positively affirmed that the majority of children with hereditary syphilis who survive the third year of life are permanently free of the disease. As to whether cases of hereditary syphilis may remain latent during the first year of life, Reff considers it impossible to determine. The editors think that it may be fairly questioned, and the fact that it is not seen is probably due to imperfect observation. The points upon which an incontestible diagnosis of hereditary syphilis could be passed, Reff considers to be: (1) the appearance of symptoms within six weeks after birth; (2) the positive exclusion of infection post-partum; (3) syphilis of the parents, especially of the mother; (4) preceding miscarriages or repeated death in children of the same parents; (5) the peculiar appearance of syphilitic children which he groups as follows: (*a*) appearance of senility; (*b*) retarded development, as shown by the infantile appearance of the genitals, retarded menstruation in women and lack of development of the breast; (*c*) Hutchinson teeth.

Augier⁵¹ considers that many facts exist showing that

Fig 1.



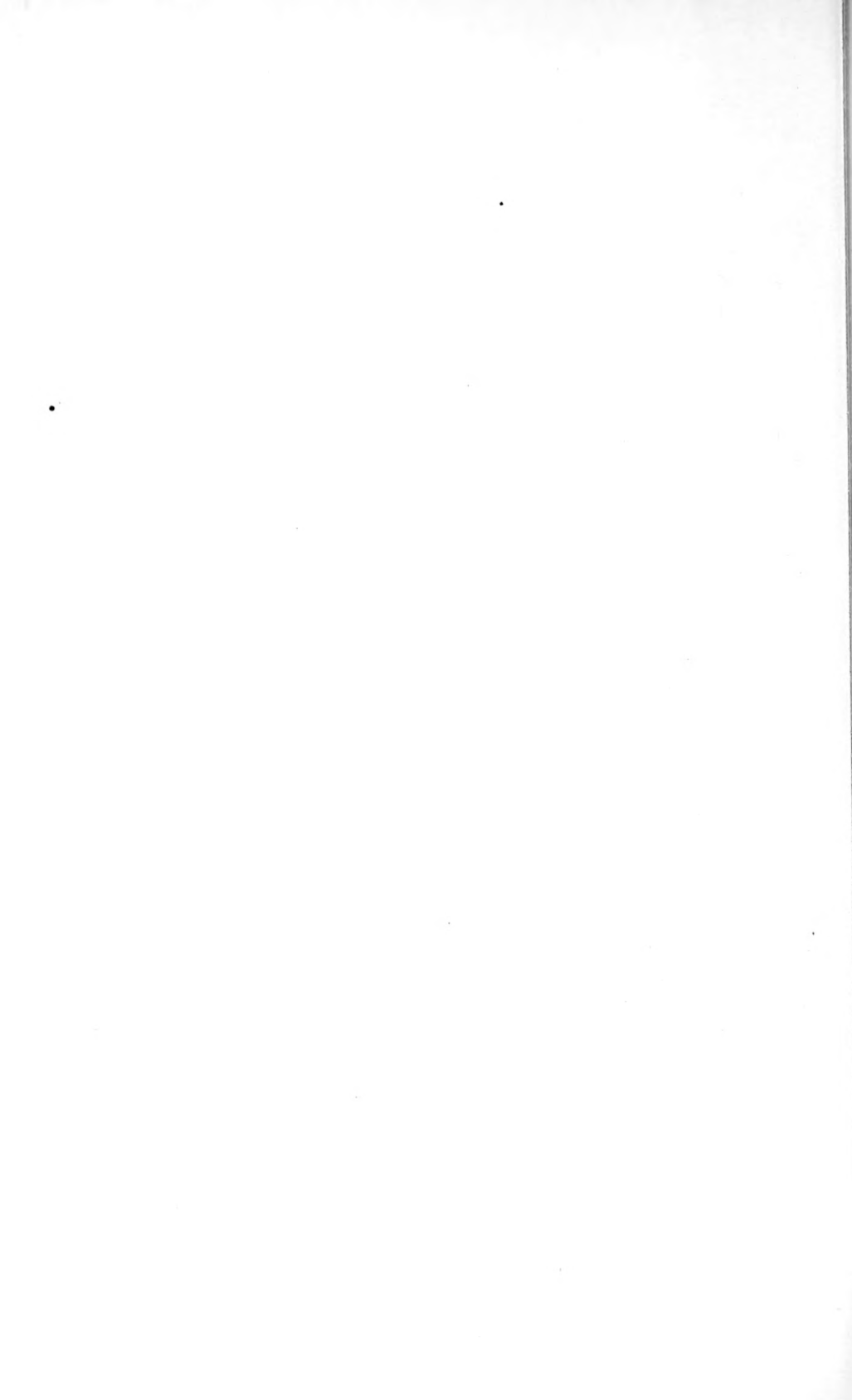
Fig 2.



Durk. & M. Petridge, Lith. Phila.

Syphilis . Bacillus . (Doutrelepon)

Viertelj. Für Dermat. und Syphilis, Wilhelm Braumüller, Pub Vienna.



hereditary syphilis is not limited to the first month, or even to the first three years of extra-uterine life. Fournier's statistics, embracing 212 cases of hereditary syphilis, renders it probable that in most cases the disease displays itself between the third and twenty-eighth year, the twelfth year showing the maximum of frequency. After the eighteenth year the frequency diminishes, and cases between the eighteenth and twenty-eighth year are mostly relapses. Upon these points Rabl considers that the appearance of syphilis may be retarded until quite advanced life. As the result of his experience he found during the first seven years but a few cases. They increase in frequency in the eighth year, and reach their maximum between the tenth and twelfth years. In the seventeenth year they diminish in frequency, and at the twentieth they again increase. Of all organs, the bones are the ones most frequently affected. Cortella⁵² gives the case of a girl, 21 years of age, who exhibited affections of the joints and bones as a result of inherited syphilis. Fournier³⁸ also agrees in the main with the possibility of a late inherited syphilis.

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SURGICAL DISEASES.

By CHRISTOPHER JOHNSTON, M.D.,

BALTIMORE.

IF in medical pathology there is still discussion as to the admissibility of specific microbes as factors in certain diseases, so in surgical pathology opposition is offered to the acceptance of observations which claim to have established the existence of causative microbes, as in tetanus; and in scanning the horizon of the departed year, it will be noted, as might be supposed, that three elements of evidence are demanded of the observer: first, that the constant presence of particular microbes shall be proven in special diseases; second, that the microbes shall, by careful cultures, be reproduced and multiplied in suitable extra-corporal media; and third, that their alleged relation to the diseases in question shall be shown to be positive and causative. Guarded by such rigorous tests, it is not surprising that advance is not rapid, although it may be assured.

If we follow progress, therefore, it will be observed that we will not always have to do with new things, but rather with successful elucidation of older problems, of newer applications of what had seemed restricted and narrow, of a happier insight into active pathology. The generalization of a few facts will have given place to the wider generalization of a thousand facts; and, applied to disease, the juster appreciation of greater positiveness in etiology will have led to an understanding of more certain indications in prophylaxis, and to a more confident precision in therapeutics. Added to all this, and without a blind faith in statistical figures, glowing tabulated statements of results pointing out a lessening death rate, must always wear a freshness which is pleasant to look upon.

Among surgical diseases, those which are infectious claim the highest interest; and bacteriology furnishes an explanation of many morbid conditions, whether existing as complications of other

affections, surgical or accidental, or as developing to all appearances, spontaneously. And besides, the microscopical examination of the products, morbid or normal, of divers diseases, serosity, blood, pus, urine, the culture of these products in suitable fluids or their inoculation in animals, have shown that certain classes of these diseases possess a common character. Dr. Barette,¹ in a contribution to the study of infectious diseases, enunciates in strict phrases the result of his researches with regard to the presence, in the blood of persons the subjects of infectious surgical diseases, of characteristic micro-organisms, and possibly toxic fluids which have found their way through a surgical lesion. As it is not known how the living, healthful elements of the body can contend against the morbid, and as the condition of the soil may, in certain instances, be favorable or otherwise, it behooves us, in a clinical study of a patient, to gather all available information with regard to all his antecedents, and to all his present conditions which might have a bearing upon the resistance or yielding of the system to the encroachment of infectious organisms. Inasmuch as the waste matters of the body, as well as toxic substances, the products of surgical diseases, organic or mineral (microbes or ptomaines) have a marked tendency to escape from the organism by the natural route of the excretions, the state of the kidneys, the chief eliminating filters, might serve to explain their relation to the retention in the body or liberation of the "micro-parasites of the blood, which always manifest a strong disposition to make their exodus by the urine." Not that the organs named are in any sense exclusive in this regard; the liver is an equally powerful elective filter, and the intestinal mucous membrane and the glands of the skin play an exceedingly important part. Thus it is that if the tissue of the excretory organs is in the enjoyment of its normal integrity, it can eliminate infectious agents provided they do not appear in overwhelming amount, and the patient may recover; or if by defect of structure and function, the viscera referred to do not eliminate, then the poison accumulates in the system and the patient succumbs.

With regard to spontaneity, Barette "hesitates to write the word," and very properly takes the high ground that there is always a "door of entrance" through which pathogenic organisms find their way.

In the paper of Barette, four cases are presented for study, of which two belong to that class of surgical troubles which are commonly designated as post-operative septicæmia, the only ones observed in six months of service in the surgical clinic of La Charité; and two others which are types of diseases denominated spontaneous, diffuse phlegmon and grave lymphangitis.

In the first case—diffuse phlegmon of the left arm—transient albuminuria—cure,—micrococci and diplococci were detected in the phlegmonous cellular tissue, in pus and in the urine, and they were reproduced in cultures.

In the second case—total amputation of the mamma—fatal septicæmic symptoms—infection at the moment of operation, although preparatory antiseptia had been carefully done. Experimental research displayed numerous diplococci and monococci in bits of cellular tissue and in the ichor drawn from the wound, in the urine and in the blood; the leucocytes being absolutely stuffed with microparasites which were found both in the protoplasm and in the nucleus itself.

Third case—vaginal hysterectomy—consecutive septicæmic symptoms with the first dressing—recovery. The vaginal fluid abounded in monococci and diplococci, and elongated delicate bacilli were met with.

The fourth and last case was a grave lymphangitis of the left leg—diffuse consecutive pannicular phlegmon—hæmorrhagic infectious nephritis—pulmonary congestion—death. Original pus, recent urine and the liver contained quantities of micro-organisms; and the kidneys were the seat of an enormous accumulation of infectious elements, crowding into the vessels and filling the tubular cells.

How the inoculating elements entered the body in the first and last cases cannot be made out; and even the conditions of individual receptivity are most frequently concealed from us. The inoculation may possibly occur at the moment of surgical traumatism.

The idea of spontaneity so ardently rejected by the bacteriologists has given place to the article of pathological faith, “no microbes, no suppuration.” But some observations of Grawitz,² if confirmed, will add a great deal to our knowledge of suppuration. From some earlier experiments Grawitz was led to believe

that in subcutaneous inflammation in which bacteria were actively concerned, suppuration was caused, not by bacteria directly, but by chemical products—ptomaines—resulting from the metabolic activity of the bacteria. According to him, therefore, the rule would hold good, that, aside from artificial phlegmons caused by the injection of ammonia or turpentine, in abscess of the subcutaneous fatty tissue, the tissues are first prepared, as it were, by the chemical products of the so-called pyogenic bacteria (*staphylococcus pyogenes aureus, albus, streptococcus*), and then the bacteria multiply and carry the process farther by the formation of new alkaloids.

Experiments have shown that many organisms not usually considered pyogenic—*e.g.*, *micrococcus prodigiosus*—furnish chemical products capable of exciting inflammation and suppuration, but as these substances have not yet been thoroughly studied, it is better to begin research in the new field with those ptomaines which have already been isolated. For this reason Grawitz used in the experiments now under consideration cadaverine,—a non-poisonous alkaloid discovered by Brieger as the result of putrefaction from different causes. “This substance a common result of putrefaction, can cause inflammation and suppuration when introduced into the tissues, as shown by Grawitz; and the fact is of great practical importance, as proving that the old views, according to which putrefaction of wound secretion is caused by pyæmic disease, are still valid. It is quite evident that there are a number of micro-organisms besides the few bearing the specific name ‘pyogenic’ that in some way or other cause suppuration; and as the putrefactive alkaloids are the result of bacterial action, it is only making another step in the process and not altering the conditions, to unite the alkaloids directly with the suppuration.”³

Barette takes a less advanced view of ptomaines, regarding them as “probably one of the forms of elimination of infectious products;” and in his thesis upon surgical infectious nephritis, lays stress upon the opinion that albumen in the course of a septic disease is a sign of renal alteration, and its appearance is determined by the passage through the renal filter of infectious products imbibed at the morbid centre.

And perhaps it may be well to reproduce the author’s conclusions with regard to the two recorded fatal cases that death

did not result from the special malignancy of the contaminating pathogenic organisms, but from the non-elimination of the infectious elements.

ERYSIPELAS.

While it is easy to admit that overcrowding in hospitals is an assignable cause of fluctuation in the appearance and mortality of erysipelas in hospitals, as declared by M. Trélat,⁴ who also enumerates "rather excessive surgical operations upon patients whose tone was too low," it is also not difficult to declare that isolation and zealous cleanliness largely aid in limiting the activity of the disease. Indeed, M. Trélat insists, in a surgical clinic at La Charité, upon individual aptitude, always variable, and upon the adoption of two necessary ameliorations: 1, in order to render abdominal operations possible, it would be necessary to establish a lesser service, well isolated, comprising a chamber for operations and two or three chambers for isolation; 2, to withdraw patients operated upon from the dangerous crowds, there should be an apartment kept perfectly in order for such patients entrusted to a special nurse, and to which none should have access or could introduce patients without his assent.

It is hardly necessary to dwell upon such requirements, which have already arisen in America out of the necessities of cases and have been fully met. Inasmuch, however, as surgeons in this country look for a low temperature, even a normal one, after operations, this opinion does not appear to be everywhere accepted; for in the Fourth Congress of Italian Surgeons, in the month of April, Ceccherelli⁵ felt justified in asserting, after careful thermometric studies in his clinic, that after every sort of operation there is always fever, varying, however, in type. On the contrary, Novaro found it difficult to admit the existence of this post-operative fever, inasmuch as his patients after operation remained apyretic unless there had been infection. Indeed, he added, after a grave operation, it is not rare to observe a decline in temperature. Iodoform, however, exalts the temperature, and this fact may account for the febrile cases of Ceccherelli; but the relation between cause and effect was such that with diminution of iodoform in the urine, a correlative fall of temperature occurred; while, on the other hand, a return to the employment of iodoform recalled the fever.

D'Antona, of Naples, objected to the word post-operative because the fever has no proper character which could distinguish it from inflammatory fever of the ancients or from traumatic fever.

Gangrene may here be better considered under the captions *Etiology, Character and Treatment.*

With regard to the first, we may as well declare that the term spontaneity is ventured upon with much hesitancy or caution by some authors, while it is almost completely disavowed by progressionists. Barette hesitates to write the word spontaneous, and Dr. Ozenne⁶ speaks of a diffuse gangrenous phlegmon of the abdominal wall as "apparently spontaneous." It can hardly be denied, however, that as the microbe of erysipelas has been isolated, cultivated and inoculated successfully, it is not necessary to attribute to accident what can be, and probably is produced by a specific cause. Such being the case, the very important question of contagion arises, and speaking affirmatively, its action would seem to depend upon the presence of floating germs, the degree of receptivity of the persons exposed and the vigor of their eliminating organs. "Fehleisen's discovery," says Desplats,⁷ "which established in an indubitable manner that erysipelas comes always from without, is very important in a doctrinal point of view and has already produced practical consequences: it imposes upon us the duty of isolating erysipelatous patients, or of never operating in their neighborhood."

But Professor Desplats, whose utterance we quote above, enunciates in the same clinic the view that surgical and medical erysipelas are identical in nature, and bases his convictions primarily upon the case of a woman who was in the Salle St. Roch in the Hôpital de la Charité one week after her accouchement and grievously ill. The normal confinement had not been preceded or followed by any antiseptic precautions. She had high temperature and local symptoms in the thigh and arm which were differently understood. The progress of the disease declared for erysipelas and the ending of it for phlegmon.

"Four days after the entrance of this patient another woman fell ill, and showed facial erysipelas the next morning; and two days after this, a male surgical patient treated previously, but who received daily visits from a student in the surgical service, was in his turn taken with the disease, although there was no other case

of erysipelas in the neighborhood. These two cases are claimed to be referable to contagion, to clear up the diagnosis of the first patient and to prove the identity of the surgical and puerperal erysipelas. Forty years ago, Oliver Wendell Holmes emphatically asserted the identity of puerperal peritonitis and erysipelas.

According to Desplats, the contagion of erysipelas is owing not simply to microbes, but all sorts of erysipelas to one and the same microbe. Round microbes, diplococci and streptococci swarm in all the circulatory apparatus and occasion various morbid and lethal phenomena, or, escaping by the kidneys, produce infectious nephritis; and the gravity of the case will depend upon the abundance of the microbes or the powerlessness of organs by which their expulsion from the body is accomplished.

Professor Desplats asks himself the question how it is that certain cases of erysipelas, as of the face, are usually benign and end in resolution, whereas others are grave and often cause death, or terminate in suppuration or gangrene. Facial erysipelas, says this speaker, may be regarded as a pure culture of the microbe of erysipelas; but surgical and puerperal erysipelas are formidable and often fatal. The true cause of this difference is not to be looked for further than in a double infection, as along with the pure culture the microbe of suppuration, of puerperal fever and of gangrene enter the system.

M. Cornil is quoted as having cultivated on gelatine and on agar the micro-organisms of a phlegmonous erysipelas, and as having witnessed the development of streptococcus of erysipelas and colonies of staphylococcus aureus (the organism of osteo-myelitis).

It is, therefore (to pursue the train of thought for the author), no longer doubtful, that the action of two sorts of microbes can simultaneously exert their baleful influence upon the same subject, and that we have here one of the causes which best explain the different terminations of erysipelas.

It is quite apposite here to refer to a case of acute spreading gangrene resulting in recovery after amputation in the middle of the thigh, reported by Brigade Surgeon C. H. Y. Goodwin.^s The cause was a corn on the ball of the little toe, which inflamed after being picked, suppurated and healed over, but became a focus of grave trouble three or four months afterward.

Inoculation of test tubes containing 5 per cent. of sterile

nutrient gelatine disclosed the presence of two distinct species of micro-organisms, namely (*a*), streptococcus pyogenes; (*b*), staphylococcus pyogenes albus; *a* being seen microscopically as single cocci and also in chains; *b* as single cocci and zoöglea-form masses.

After what has preceded, it might be supposed that the "contagiousness of erysipelas was not only absolutely established, but that the agent of infection was everywhere admitted and recognized." But such is not at all the case; for the same journal which reports M. Terrier⁹ as calling attention to the fact that among those operated upon surgically during the year 1886, but one had erysipelas, and that was to be accounted for by the voluntary exposure of the patient in the medical wards where erysipelas is common,—quotes M. Desprès as saying: "I do not believe in the contagiousness of erysipelas; and whether there be or be not erysipelas in the ward, I am not in the least hindered when I have capital operations to perform."

But medical sentiment is adverse to such doctrine, and it is nowhere more emphatically expressed than in the remarks of Dr. R. F. Weir,¹⁰ who wished to know "whether it was not proper to put on record a protest against the retention of erysipelatous patients in the ward of hospitals for treatment." Against admission of such cases all would doubtless agree in this country; but as the disease may not, at the time of application, have been developed or diagnosticated, the protest appears to advantage, although not laying claim to novelty or originality.

There is certainly one point in pathology to which Dr. George L. Peabody recalled attention, and that is as to some alliance between erysipelas and pneumonia. He made the statement that there had been nine cases of the former following lobar pneumonia in the New York Hospital from January to March. Dr. W. H. Draper had also met with such a case. The discussion of this question, however, is foreign to our present purpose; but it will surprise few medical readers to be told that all pneumonias are not alike; and that in many pneumonias the history of the patient and of his case will hardly justify the acceptance of "exposure to cold" as being alone satisfactory in the etiology of the disease.

And lastly, in this connection, we have briefly to consider erysipelas after vaccination, not that the latter, as such, should be

regarded as causative of the former, but because of the appearance, as in England, of a number of cases of fatal erysipelas and of the complaints which these cases occasioned. With our present knowledge of the etiology of the disease, it would not be surprising that amid certain surroundings, all wounds might open a way to infection, and it would be quite immaterial whether the primary scratching or the broken vesicle should be the gateway, except as to the date of the appearance of the blush. The report of three cases of fatal erysipelas after vaccination submitted to the local Government Board by Dr. Airy¹¹ fully justify the views above expressed. The vaccinators were different, but had all been successful with the same lymph in other children who had escaped all infection. In the cases, however, we meet with the same history of exposure to morbid influences in unhealthy neighborhoods and the same lowering of tone by their conditions of life of which evidence was adduced to show that other persons were affected with abscess, scarlet fever, or even erysipelas.

This is answered further by a note placed at the head of the report by Dr. Buchanan. Taking septic diseases registered as having followed vaccination, he points out that in England and Wales during 1883—the latest period for which comparable data were available—the number of infants receiving either scratches or pricks in the process of vaccination was 763,192. The operation was followed by ill consequences in certain of these children, and 51 of them died, all or about all, from septic diseases. Now in England and Wales the number of infants under one year of age was in 1883, over 760,000. By some mischance or other, but apart from any recorded connection with vaccination, a certain number of these children became subjects of septic disease, and of that number 724 died before completing one year of age. These facts may well be borne in mind, for they point to the circumstance that whilst a vaccination scratch is, like any other wound, liable to receive the erysipelatous poison, this result is really a rare one when compared with erysipelatous or septic occurrences following on other causes. Now this raises the question whether vaccination accidents are at all preliminaries to erysipelas.

Von Wolfenberg,¹² referring to the etiology of erysipelas, observes that there can be no doubt that an early form of erysipelas is certainly an accidental disease, the result of infection of wounds,

but with regard to a so-called tardy form which seizes upon the normal areola of the vaccine vesicle, the matter is essentially more difficult. The vaccine virus, which under certain favorable conditions produces the vesicle, belongs, according to von Wolfenberg, to the class of infecting matters which produce in the skin an erysipelatos inflammation. This form of erysipelatos inflammation is a consequence of the remarkable growth of the vaccine contagion, which regularly environs the vaccinated spot on the tenth day, and limits itself to the formation of an areola as soon as the immunity of the skin shall have been recovered. But at this juncture one of two things may happen: either the skin may not enjoy immunity, whereupon the vaccine erysipelas spreads; or the infection occasioned by the micrococcus of Fehleisen may occur. In either case the vaccinated part will have become erysipelatos.

These views are declared by the author to be of practical as well as of theoretical interest. Thus, in cases of vaccine erysipelas of the later kind, it is much to be desired that the progress of the disease be restrained by vaccination itself, which, done with stronger virus at the border of the erysipelas in healthy tissue, may bring about an acceleration of the establishment of immunity.

This suggestion of treatment leads to a consideration of some of the means employed. And here we may notice a résumé of 70 cases of erysipelas reported by Carl Schadeck¹³ and treated in the year 1885 in the military hospital of Kiev, with a mortality of 3 and recovery of 67. There were 67 cases of "idiopathic" disease (erysipelas of the face and hairy scalp) and but 3 surgical cases. There were 10 cases occurring in the hospital, 4 nurses and 6 patients, treated in the several services of the hospital; therefore the contagiousness of erysipelas is undeniable. The complications were numerous, being chiefly croupous pneumonia, pulmonary œdema, lobular pneumonia, capillary bronchitis, exudative pericarditis, and a very considerable number of phlegmonous abscesses, *codem loco*, suppurating phlegmonous anginas, otitis of the external and middle ear, and erysipelas of the throat. Besides there was œdema of the face 3 times, and 3 times only a partial alopecia. Erysipelas is regarded by the author named as an essentially relapsing disease. In this epidemic, says Schadeck, 7 relapses were observed; in 3 cases twice; in 2 cases 3 times; in 1 case 4 times; and in the last case 7 times. With this exhibit and

expression of opinion, it is not surprising that isolation is enforced.

Local treatment consisted simply of the application of iodofomed collodion, which allayed the symptoms and even exercised a specific or abortive action, as Clark, Bergman and Selitzky supposed. Resorcin and nitrate of silver, employed in some cases, did not yield very satisfactory results. Internally, in grave cases, wine was administered freely, and sometimes camphor, ether and quinine. The quinine, even in high doses, did not show itself to be a very efficient antipyretic. And finally, to overcome persistent œdema of the face, Habermann recommends massage. Here let us say, however, that the state of the kidneys is not given; and that we have been left to conjecture the cause of the facial œdema which has become persistent.

Desplats,¹⁴ of Lille, regards the treatment of erysipelas as "purely symptomatic and empirical." Cleansing with soap and water and a sublimated bath or two seem worthy of trial. Interstitial injections around the border of the disease, and pomades and solutions applied as parasitocides, have unfortunately been of no service. But calm the fever, allay vomiting, appease pain, if there be any, and overcome insomnia; this being done, wait and proceed according to circumstances.

Without departing from the empirical, however, Nussbaum,¹⁵ of Munich, claims remarkable results from the local use of ichthyol, a substance obtained from mineral oil and rich in sulphur, and applied in a 10 per cent. mixture with vaseline in cases of traumatic erysipelas. Dr. Unna introduced ichthyol toward the end of 1886, and Dr. Dubelir, of Moscow, found it useful in acute and chronic rheumatism, both as an internal and external remedy. Dr. Nussbaum repeating the experience of Dr. Dubelir, found the external application to be irritating and not endurable for more than three days, but as this was long enough to effect a cure in all the cases, no difficulty arose on this head.

The employment of carbolic acid pulverizations, as recommended by Verneuil, would appear to have been very successful in the hands of Dr. Ory.¹⁶ This gentleman communicated two cases to the Société Médico-pratique of Paris at a recent meeting, one of which was that of an infant suffering from erysipelas following vaccination. At first he tried collodion and castor-oil locally, and

antispasmodics internally,—for the child was convulsed,—but with no abatement of the symptoms. The child was now wrapped in cotton wool and a two per cent. solution of carbolic acid in pulverization was used, and with very marked advantage. The applications were made every hour for five minutes at a time; convulsive motions ceased, the temperature fell and diarrhoea disappeared; on the evening of the following day all traces of the erysipelas vanished and rapid recovery ensued without any relapse, all treatment having been discontinued on the fifth day. The other case was that of an old man, aged 69, ataxic and subject to obstinate constipation. The perineal and gluteal regions were attacked with erysipelas. The carbolic pulverizations were applied as above stated and with satisfactory results. From the first evening the pain diminished after each pulverization, and on the third the tissues had almost recovered their natural color. Dr. Ory is of the opinion that carbolic acid pulverizations might be used to the exclusion of all internal treatment for combating erysipelas.

Our own experience has resulted in a very favorable opinion of sublimate bathing of the parts, 1-1000 and the protection of wounds with iodoform gauze, in mild cases of erysipelas.

In severe cases, however, the sublimate treatment, as practiced by Dr. Fraipont,¹⁷ of Liège, deserves notice, not perhaps on account of its entire novelty, but by reason of the boldness of the procedure, which was inspired by Prof. von Winiwärter. Its application was successful in a certain number of cases. If the limbs are the seat of the erysipelas, the diseased part should be entirely placed in a warm bath of the solution of sublimate, 3 per 1000, and kept there for about 10 minutes. The wound especially must be immersed. If this is not possible, then free washing of the member and of the wound must be resorted to. The greater the loss of substance, the more assiduously must it be sprinkled; and if an anfractuous wound exist, or purulent cavities or drains, all these must be carefully irrigated so that the liquid may be placed in contact with their walls everywhere. Now make application over the lesion of iodoform gauze moderately moistened with the sublimate solution, and after having well dried the part diseased, paint it over with liquid tar, and even let the application extend three fingers' width beyond the erysipelatous redness. The whole is now to be enveloped in a dressing moistened with the liquor of

Burow and kept in place by a lightly compressing bandage. The next day, especially after a bath, the epidermis, if macerated, comes off in great strips, leaving the dermis marked and slightly bleeding. For fear of dangerous absorption, the strength of the solution is now reduced to 1-2 per 1000.

In 4 of the 5 cases referred to by Fraipont the disease was at once arrested upon the very day of the institution of the treatment. In every one of the cases there were extensive or deep wounds, presenting great surfaces for absorption, by which the sublimate could penetrate in sufficient quantity to kill the larger part of the pathogenic micrococci; and we may well believe that the tar reinforced the action of the sublimate, inasmuch as the epidermis having been macerated and detached, a moist surface was left by which the antiseptic principles of the tar could be absorbed.

In the same article Dr. Fraipont gives the formula of the fluid of Burow. It is as follows:—

Crude alum,	. . . . .	5 grammes.
Crystallized acetate of lead,	. . . . .	25 “
Distilled water,	. . . . .	500 “

M. Fraipont believes that this liquid may often replace the antiseptic dressing of Lister; and that after infiltration it may be employed with great advantage in the continuous irrigation of wounds.

In this account of the treatment of a few, say five cases of erysipelas, we are disposed to inquire if the superstructure of opinion and practice be not too lofty for so small a foundation of facts; and whether Burow's solution would consist of any thing more than a solution of excess of acetate of lead after the decomposition of a part of that substance by the sulphate of alumina, and a little acetate of alumina and potash.

Lorenz¹⁸ reports his success with ichthyol in the treatment of erysipelas. He used a solution of 20 parts of ichthyol and 10 parts each of ether and glycerine, one application arresting a spreading facial erysipelas. A second case was more striking, erysipelas having spread over the entire face and neck. The patient was delirious. Ichthyol was thoroughly applied, and application was renewed every three hours with flannel and covered with flannel. The next day Lorenz was astonished at the favorable change which had taken place; and in a few days the patient was cured.

Dr. Ludwig Frey¹⁹ reviews in a recent paper cases wherein iodoform has prevented or arrested erysipelas, and endeavors to explain its efficacy. He sums up as follows: According to his present experience, we may define our antiseptics as remedies which regularly ward off infection from wounds and render ineffectual the germs actually present, but which occasionally remain without effect. With regard to iodoform, however, according to his observations, we may modify the definition given above or state it as follows: That iodoform regularly protects wounds from infection; prevents the intrusion of new growths; renders harmless those already present; is able, in many cases, to keep the wound aseptic; has no power to prevent the development of already existing germs and those slipping in later; and is without effect in very few cases. According therefore, to what Dr. Frey says above, the germs are rendered innocuous and ineffective without interfering with their actual growth and development.

Von Eiselsberg¹⁸ tested the air in surgical wards by exposing gelatin and agar plates in various parts of them for a certain length of time. Colonies of different kinds of organisms were found, in one instance *staphylococcus pyogenes aureus*. In a ward where there were four cases of erysipelas he obtained a development of colonies of streptococci on two occasions. On testing these organisms further by cultivation and by experiments on animals, he found that they were Fehleisen's erysipelas cocci. In an isolation ward wherein there was a patient with erysipelas of the face that was almost well and desquamating, and of the back, which was still affected, agar plates were exposed, one of them being placed close to the head of the patient. In the latter plate only did the streptococcus of erysipelas develop. In five cases, also, Eiselsberg made cultivations with the cutaneous scales of patients suffering with erysipelas, and in four cases cultivations of the streptococcus were obtained. The author believes that it is the cutaneous scales which carry the virus through the air.

GANGRENE.

From erysipelas to gangrene the transition is easy, as may be exemplified by an instance of diffuse gangrenous phlegmon of the abdominal wall, reported by Dr. Ozenne.²⁰ The case was one of those not entirely usual ones which, nevertheless, call for careful

diagnosis and wise treatment. The patient was 45 years of age, son and brother of an arthritic person, and syphilitic for 20 years. On the 20th of January there appeared without apparent cause, a bogginess of the tegument on a level with the left iliac fossa. Without creating febrile reaction, the swelling continued, exciting no pain and allowing the patient to attend to his affairs. On the 26th of January the tumefaction increased and pain began to assert itself. On the 28th, the swelling had greatly extended, the skin had become red and a little warmer just over the centre of the projection which occupied the whole of the iliac region trenching upon the hypogastric, and had, apparently, no connection with the deeper organs of the region. Some pustules of eczema were observed upon the legs, but otherwise the organs were in excellent condition; urine clear without albumen, but yielding 5 grammes to the litre (2 litres in 24 hours) of glucose. Treatment purgative. Two days afterward, without fever or pain, the swelling increased, œdema engaged the pubis and penis, and on the night of the 30th of January sphacelus seized upon the most projecting part of the tumefaction. The 31st of January a free incision with the thermo-cautery was made down to the aponeurosis and out of it could be squeezed a little ill-conditioned serous pus.

Three times a day carbolized injections were made into the wound, which was covered with a carbolized dressing. The ordinary treatment of diabetes was instituted,—bromide of potassium, Rochelle salts, quinquina, etc., and continued for some time, aided by cataplasms, until five weeks after the beginning, the wound was reduced to a linear granulating surface.

Examination of the urine gave the following results:—

2 days before incision, glucose, 5 grammes to the litre;

5 days after incision, 2 grammes to the litre;

10 days after incision, nothing;

20 days after incision, glucose, a light precipitate.

The author is of opinion that this observation is interesting from the triple points of view, of etiology, symptomatology and treatment. First of all, in presence of its apparently spontaneous development, we must think of the pathogenic influence of some latent constitutional condition. Setting aside all ideas of syphilis, alcoholism, and even albuminuria, glycosuria seemed to have been associated with the cause.

And here we pass on for a moment to call attention in this diabetic to the indolence of this phlegmon and the little sensibility of the skin when the incision was made. These troubles of sensibility, this kind of toxic analgesia, have been remarked by some authors, as in particular by Prof. Verneuil, who has frequently insisted upon them in his clinics.

A second case is reported by the same author, of a woman in the service of M. Duprés, who was diabetic, and in whom the pain of a large anthrax on the nape of the neck was inconsiderable. Such experiences are, doubtless, quite common.

We ought here to mention the review of a *thèse d'agrégation*²¹ upon gangrenous septicæmias, and quote a few lines which, without presenting anything more novel than positive statements instead of loose views, have the interest which precision of knowledge affords. "Experimental medicine of to-day," says the writer, "has established the parasitic nature of the virus, until recently quite indefinite; it has studied and isolated the septic vibron, the probable infectious agent, it has provoked experimental gangrenous septicæmias analogous to the clinical forms of human pathology, a prophylaxis more efficacious, and better ordered therapeutical indications." And further on, the editor declares that gangrenous septicæmia is inoculated upon recent wounds only; that septic inoculation is the essentially determining cause of the disease; and that gangrenous septicæmia is accurately defined and easily diagnosed in its typical form. But there are traumatic complex intoxications about which difficulties of diagnosis start up; traumatic gangrenes by compression by contusion and attrition of tissues; by vascular lesions; the bronzed phlegmon of diathesics; the acute *purulentes œdem* of Pirogoff; infectious myositis; gangrenous lymphangitis; hospital gangrene; and symptomatic charbon. The differential diagnosis is simplified since antisepsis has detached gangrenous septicæmia from the morbid coexistences which complicated its symptomatic category.

We propose to conclude this subject with a brief notice of a few cases: Horner²² was called to a patient to deliver a placenta 72 hours after the birth of the child. Using his right hand, he brought away the placenta. The woman's temperature was 105° at the time, and she died two days afterward. On the day succeeding the birth four blisters formed below the doctor's elbow, the

arm began to swell and to be streaked with red in the course of the lymphatics. The four blisters became four ulcers, and he had two abscesses on the right side of the neck. Temperature rose to 103, and finally after about six weeks' sickness he recovered. Evidently a case of septicæmia.

Will.²³ "A case of gangrene of both upper extremities in consequence of arteritis obliterans," the etiology being unknown.

In this case, a shepherd aged 52, had a blood blister on the third finger of his left hand four weeks before his admission into the hospital. The symptoms continued, with excessive pain in the whole limb, which did not cease after the removal of the diseased finger. Before this operation it was noticed that the radial and the ulnar pulse were absent on both sides, the arteries feeling like rigid tubes. No irregularity of the heart could be ascertained. The gangrene of the left hand advanced slowly; a similar process developed in the right hand and rapidly extended toward the forearm. The patient died of sepsis four weeks after admission.

The post-mortem showed chronic arteritis with localized formations of calcareous masses in the middle coat; and the arteries of the forearm were totally obliterated and filled with softening thrombi. The aorta and the descending branches were healthy as far as the origin of the external and internal branches. This case, observed in Prof. Schönberg's clinic, was introduced as exceptional, inasmuch as in cases of gangrene owing to arteritis obliterans the lower extremities are nearly always affected. We may remark that such cases are far from uncommon, for the writer of this article amputated successfully both forearms of a carpenter for the same cause.

In such a case, there can be no difficulty in determining whether gangrene be likely to extend after its first appearance; but it is not so easy to ascertain whether gangrene is likely to follow severe injury of a limb. The following method of procedure of W. Scott Lang, of Edinburgh, enables the surgeon to arrive at a definite idea of the probability of the circulation being restored: "Gently raise the limb and keep it raised for some two or three minutes to empty it in some degree of its blood; then apply a tourniquet or piece of elastic webbing on the proximal side of the injury and keep it applied for about a minute. Lower the limb, remove the tourniquet, and if sufficient circulation remains, the

part beyond the seat of injury will blush rosy red, and will show in an unmistakable manner the condition of the blood-vessels." This procedure was adopted by Lang in the case of a badly crushed limb, both bones being broken, and the member almost dangling and hopeless. No amputation was done, but some pieces of bone were removed, and by drainage and the usual treatment of compound fractures, the boy made an excellent recovery, with a useful limb.

TRAUMATIC TETANUS.

Very naturally the etiology of tetanus occupies, as it ought, a large part of the medical mind at present. Infectivity and climatic conditions have divided observers as to the mode of origin of tetanus, Nicolaïef and Flügge's recent researches tending to support the view that it is a disease which can be communicated by inoculation; while epidemiology has shown it to be clearly dependent upon the condition of climate. Flügge²⁴ believes the infective agent to be a bacillus which he states is to be found in many kinds of ordinary earth, thus serving to explain the sudden outbursts of tetanus among the wounded after great battles. Perhaps the less usual way of infection by inoculation is shown in the fact that Dr. Wing, a veterinary surgeon in our country, died recently of tetanus, some time after making a post-mortem examination of a horse that had died of lock-jaw.

At a recent meeting of the Paris Surgical Society, M. Larger²⁵ offered new facts which he considered convincing proofs of tetanus being infectious. They were strangely coincidental cases of tetanus in two patients although four years had elapsed between the first and the second cases. M. Larger stated that the same thing had occurred four times, and that the cause was more than coincidence.

M. Verneuil,²⁶ in support of his theory of the contagiousness of tetanus, presented a more striking array of testimony than he had offered before. He first quoted from Larger's account of a circumscribed epidemic in the hospital of Colmar in 1882. In the month of January, three cases occurred in three adjoining beds, and a fourth case occurred in 1886 in a bed that had been occupied by the first victim four years before. None of the patients had been accustomed to handle horses and in all the the wounds were cases treated with phenic acid.

Again, M. Verneuil offered the experience of M. Cagnat, a veterinarian at St. Denis. In 25 years' practice he had not seen a single case of tetanus. Toward the close of 1884, he removed a tumefied testicle with the *écraseur*, and the patient, a horse, died of tetanus. In the course of the next six months he castrated five additional horses, and they all died of tetanus. Other horses that he had castrated with clamps had not had tetanus. Another instance, somewhat less striking, was that of M. Huvelier, a veterinarian of Alençon, who castrated fifteen horses in one day, and all but one of them died of tetanus. A third veterinary series occurred to M. Bounian of Montbrison. In the course of ten days he castrated six bulls and operated on three fillies for umbilical hernia. Five of the bulls and one of the fillies contracted tetanus.

With regard to human patients, M. Verneuil adduced the case of a hospital for miners at St. Etienne, with 24 beds, in which the only four amputations done in the course of three years were followed by tetanus. He then alluded to the acknowledged frequency of tetanus after gunshot wounds received in battle, which are especially exposed to inoculation with instruments that are used without thorough cleansing.

M. Verneuil's conclusions are as follow: 1. Operators may transmit tetanus to patients, human and animal, singly or in series. 2. Among the factors of transmission may be included instruments which, becoming tainted with the poison, prove the agents of mediate contagion. 3. The contagion may be conveyed by these instruments after long intervals, implying in the virus fixity, adherence, persistent vitality, and powerful resistance to causes of destruction. 4. These conclusions suggest, as an efficient preventive, the thorough disinfection of instruments.

Apart from the effect of climatic rather than infective influences, a writer very justly observes that the presence of a pathogenic microbe is not the sole essential to the production of disease. There must be susceptibility of the part inflamed or otherwise debilitated, or of the system, with an abnormally low vitality. Careful experiment of inoculation, must therefore put the matter to a more severe test. Verneuil's cases are alleged to have been derived from wounds received from or about horses that were not the subjects of tetanus. Either, then, we must assume that sound horses produce the poison, in which case tetanus ought not to be

the rare disease that it is, or we must reject this extraordinary part of Verneuil's theory.

In the discussion of the nature, etiology and treatment of tetanus in the French Congress of Surgery, we meet with Verneuil's²⁷ summary of the animal theory of tetanus, under the four following heads: 1. The cases of tetanus in man occur in those who have had to do with tetanic horses. This is what Larger states. 2. The particular frequency of tetanus in man after the bites and wounds made by horses. 3. The frequency of tetanus in people who habitually have to do with horses. 4. The appearance of tetanus in consequence of wounds which have been in contact with ground soiled with the defecations of horses. The facts of Nicolaïer and of Pflüger are not conclusive. These authors were unable to produce tetanus in dogs, and hence state that these animals are exempt from tetanus. Notwithstanding these unsuccessful experiments, Larger considers this disease as an especially contagious affection, because clinical proof to this effect is undeniable.

It is needless to say that Verneuil's hypotheses are very far from being proven. In Germany, on the other hand, Nicolaïer²⁸ claims to have isolated a specific microbe of tetanus. Rosenbach could not obtain pure cultures of this bacillus, but the injection of a liquid containing the true microbe and a common bacillus always gave positive results in the hands of this skillful experimenter. M. Routier adds that it appears therefore to be with tetanus as with many other diseases nowadays—that it is in all probability a parasitic affection. Brieger has apparently shown that tetanus is due to a ptomaine, and one of these ptomaines called tetanin when introduced into the lower animals will produce symptoms nearly identical with tetanus; and Dr. Whittaker,²⁹ after stating that artificial tetanus may be produced in animals by injecting pus from the wound of a human being suffering with tetanus, declares that it seems reasonable to believe that most, if not all of the cases of trismus neonatorum, as well as of traumatic tetanus, are due to the action of the tetanus microbe and of the ptomaine tetanin.

We here summarize extended remarks by Prof. L. Brieger³⁰ upon the etiology of traumatic tetanus, delivered in the medical University clinic in Berlin, as most directly bearing upon the matter in question.

Many theories, says Brieger, have been broached as to the

nature of tetanus, but none of them have been able to maintain themselves in the face of rigid investigation. The external circumstances under which tetanus was seen to develop were conceived to be causative. Thus tetanus was supposed to be a special consequence of wounds of the hands, fingers and lower extremities, forgetting that these parts of the body are oftenest injured, and so in them tetanus is more frequently produced.

Tetanus is more common in the colored race than in white men, less frequent in women than in men. Its appearance is especially promoted by injurious atmospheric and telluric influences. Even pathological anatomy has hitherto lent no aid. After many vain attempts to produce tetanus in rabbits and dogs by subcutaneous injection of pus and blood from tetanized persons, Carle and Rattone in 1884 succeeded in developing fatal tetanus by injecting into the sheath of the sciatic nerve, the dorsal muscles, and the vertebral canal of rabbits, the contents of an acne pustule from a man who had died of tetanus two hours previously; and with fragments of nerve substance taken from these rabbits, they were able to infect other rabbits in turn.

Arthur Nicolaïer, who worked under Flügge, found in experiments with earth, an anærobic bacillus, which, injected subcutaneously in animals, produced a complexus of symptoms only to be considered as tetanic. Rosenbach, of Göttingen, has found the same bacillus in the wounds of a person dead from tetanus. Animals inoculated with the micro-organisms of Rosenbach presented the identical symptoms obtained by Nicolaïer after inoculation with earth, and surgeons unanimously acknowledged the symptoms developed by Rosenbach in inoculated animals to be identical with those of tetanus in the human subject. Mice, guinea pigs and rabbits are susceptible, but can endure for several days. Dogs, however, are refractory.

The exciter of tetanus presents itself as a fine linear rod, at one extremity of which is found, at first, a small colored head, and later a barely colored spore. An absolutely pure culture of this bacillus has hitherto been found impossible to obtain. Flügge, as Rosenbach states, has recently so far succeeded as that his cultures were exposed to a heat of 100 C. for 5 minutes. The discoverer thinks that these bacilli produce a chemical poison which occasions the terrible nervous phenomena peculiar to tetanus. It is here

necessary to resort to chemistry to clear up this point. Prof. Brieger obtained some cultures not perfectly pure, descendants of Rosenbach's cultures. On chemical analysis he found four poisonous ptomaines or toxins, viz., 1 which he calls tetanin; 2 tetanotoxin; 3 chloride of toxin; and 4 spasmotoxin. All these toxins produced tetanic spasms and death in animals subcutaneously inoculated with them. Brieger states that these toxins best increased in bouillon at a temperature of from 36 to 37.5. Higher temperature prevented their formation and eventually decomposed them. He suggests that fever may be nature's method of getting rid of them.

Examination of the urine (in a single case) of a man dead of tetanus gave no results; nor were animals injected therewith affected by it.

Whence comes the tetanus microbe? and how does it get into the soil? Verneuil remarks on the frequency of tetanus in persons who handle horses, and cites cases, as does also Larger, which show an undoubted transfer of tetanus from horses to men.

Brieger has found tetanin along with other ptomaines in some portions of human bodies stored away and rotting over a stable, but could not produce tetanus by injection of horse dung in animals. He confesses himself unable to propose any new treatment for the disease in question, but believes that it will some day be possible to introduce into the diseased organism substances which will unite with and render harmless, or decompose entirely, the harmful matter. We cannot take leave of this subject without reproducing the conclusions of Dr. E. O. Shakespeare,³¹ arrived at as the result of a long series of experiments, the author's personal researches:—

1. Traumatic tetanus of the horse and mule is, at least sometimes, if not always, an infectious disease, transmissible to other animals, and therefore, possibly, also to man; and during the progress of this disease a virus is elaborated and multiplied which is capable of producing infectious disease in some other animals when placed beneath the dura-mater of the cerebrum.

2. This virus is contained in the medulla and spinal marrow of the animal suffering from the disease.

Conclusions drawn from the author's experience correlated with those of Nicholaïer, Carle and Rattone, Rosenbach, Ferrari, Flügge, Hochsinger, and others.

Traumatic tetanus of the lower animals and of men, at least sometimes, possibly always, is a specific infectious virus which exists in the tissues at the seat of infection, in the blood and in the central cerebro-spinal nervous system.

In view of the experimental evidence which we possess at present, and of numerous unassailable observations of many surgeons and veterinarians, there seems to be ample warrant for the admission that not unfrequently tetanus in man is acquired directly and indirectly from some of the domestic animals which surround him, notably the horse.

Finally, we reproduce an experimental study of the etiology of tetanus, by Drs. Carle and Rattone:—³²

On the 29th of September, 1883, a man entered the Hospital St. Maurice in Turin, with tetanus, the result of a trifling lesion of the cervical region, an irritated acne, around which a resisting infiltration of the size of a nut had appeared. The patient, affected with trismus, died the day after his admission. Two hours after his death, the lesion was excised, and with a crushed fragment of it an emulsion was made with water, and with instruments which had been absolutely purified. This fluid, preserved pure with all possible precautions, was found to be rich in micro-organisms, some in the form of bacteria and others quite round. Twelve rabbits were inoculated with it, with the result of producing in all tetanic symptoms and death. Four other rabbits were inoculated with products gathered from the animals of the first series; two received by injection an emulsion of a fragment of the sciatic nerve above the point of injection. The result obtained was similar to the preceding. Two were inoculated with the blood of tetanized rabbits, with no result.

As counter-experiments, six rabbits were inoculated with septic substances, pus, putrefied blood and cadaveric tissues; and two with strychnine. Death occurred in all the cases, but with an entirely different symptomatology, not recalling tetanus in any way.

The authors draw from these experiments the following conclusions: 1. Human tetanus is an infectious disease. 2. It is transmissible from man to the rabbit. 3. It is transmissible from rabbit to rabbit. We have adduced these experiments, although dating from 1883, because of their inherent value, and because of

reference which several authors have made to them and to the conclusions derived from them. A recent letter from Paris³³ sums up very neatly the attitude of pathologists with regard to the etiology of tetanus:—

The etiology of tetanus divides pathologists into two camps. Those on one side admit that, if this malady frequently succeeds a wound, it may also originate without previous solution of continuity and under the influence of different causes, the principal being cold; hence two forms,—traumatized or surgical tetanus, and spontaneous, idiopathic, or medical. For the others, the malady is always traumatic; whence two doctrines,—that of dualists and that of unicists. Verneuil entirely rejects the opinion of the dualists, and classes tetanus with microbial diseases, virulent or infectious. The pathological problem he states, reduces itself to discover how and when the penetration of the virus is effected, and what circumstances favor or hinder it. “If, as the ancient unicists thought, penetration is always effected through an adequate opening, the pathogeny, as simple as the etiology, would allow of only one process,—breaking, effraction. But as the infection might take place when the solution of continuity of pathological origin, inflammatory or even traumatic, is covered over with a granular membrane, continued and protective, one may believe that the virus had penetrated without violence by a second mechanism which would admit of a second form,—tetanus by absorption. But, as certain subjects appear to have no solution of continuity, recent or ancient, internal or external, but have been seized with tetanus by exposure to cold, by lying out, for instance, on a cold field, nothing could prevent the idea that they had absorbed by the respiratory mucous membrane or by the skin, supposed to be intact, the tetanic virus with which the soil is at times certainly impregnated; whence a second variety of penetration by absorption without any traumatic or pathological preparation, as occurs with malaria, and without doubt with scarlet fever, whooping cough, etc.” The dualism, therefore, the conception of which is combated by Verneuil, may be revived but under another form, and in changing the terms of the problem, that is to say it will not be possible to tell whether the tetanus is medical, idiopathic, essential, traumatic, spontaneous, rheumatic, etc., which, however, is of no practical importance, but careful search would be made as to where and by

what process the virus had penetrated, and if it be desired that their dichotomic division should be preserved, a tetanus by effraction, and a tetanus by absorption may be admitted. In any case there will be no spontaneous tetanus, as a poison, always identical, playing the part of a constant and necessary cause, will always be found.

In an article upon the electrical and mechanical excitability of the nerves and muscles in tetanus, Dr. Lothar v. Frankl-Hochwart,³⁴ of Vienna, was able to give the result of observations on 19 cases of tetanus, of which one followed extirpation of goitre, two attacked pregnant women of the working class, and the remaining sixteen occurred in working people of youthful age.

The electric examination was conducted by means both of the faradic and of the galvanic currents. For the galvanic, Gartner's apparatus was employed and proved itself a most reliable instrument.

The operator first made experiments on five healthful persons or at least with healthful nervous systems, and established a standard of excitability. He discovered that high galvanic and high faradic excitability do not always coexist. In 18 out of 19 of the tetanized individuals, he found a marked increase of susceptibility to the galvanic current, but rarely to the faradic, and in only a single case increased faradic excitability with increase of the galvanic. Two individuals who, in strong tetanic spasms, had exhibited normal faradic with increased galvanic excitability, showed, after the attack passed away, normal galvanic and unchanged faradic. Similar results attended the examination of the muscles; but there was increase of excitability in only 14 persons out of 18.

The dissimilar mode of action of the two currents, is therefore almost the rule in tetanus. As to the nerves, increased excitability was constant in the ulnar; then followed in order the radial, median, facial and peroneal. The fact that the ulnar is so constant in its increased excitability agrees with an observation of Erb. This author states that in tetanic spasm the hand is always found in such a position as to indicate that the ulnar nerve is excited.

The phenomena of the facial nerves constitute a means of examination of great importance. In many points it may be con-

sidered as entirely pathognomonic. I found this phenomenon, moreover, in three persons who had neither suffered from cramps nor exhibited troublesome symptoms; yet they complained of a certain weariness and painfulness in the extremities. In two cases the nervo-muscular excitability showed increase. In one individual, lassitude came on after 14 days' rest; whereupon the facial phenomenon immediately disappeared, as well as the increase of electrical excitability. Typical and pronounced facial phenomena were seen in more than twenty persons who never had a spasm or complained of pain or exhaustion in the extremities, nor exhibited the symptoms of Trousseau. These were for the most part youthful persons of the working classes, generally of feeble constitution, frequently lymphatic and sometimes afflicted with a catarrh. Of four cases examined electrically, two only showed a slightly increased excitability.

Treatment.—It is well known that when remedies for a particular disease multiply, failure is the common lot of very many. With regard to traumatic tetanus, it is easy to perceive that the wound of infection and the nervous symptoms from the earliest time attracted attention; and even now remedies which counteract the violence of the spasms or which overcome them, are employed with as much confidence as a high death rate will allow. But with the disposition toward a change of view regarding the etiology of tetanus, we ought to expect suggestions as to measures calculated to destroy the effect or aid in eliminating the poison of bacilli or of ptomaines. But this field of therapeutics is really virgin.

Routier,³⁵ in a case of subacute traumatic tetanus, partial in form, used a potion containing 6 grammes of chloral, and subsequently another potion containing 7 grammes of the same substance.

Dr. J. C. McMechan³⁶ cured a case of traumatic tetanus with hypodermic injections of morphine. Dr. R. C. McChord³⁷ treated four cases of acute traumatic tetanus as follows: First case with bromide of potassium and chloroform; recovered. Second case, with bromide of potassium and chloroform, which, although the mildest of the cases, died. Third case, with chloroform, bromide of potassium and chloral; recovered physically, but mentally a wreck; and the fourth case suffered amputation of a finger, took

bromide of potassium and chloral, with perfect recovery in every respect.

Dr. Mayer³⁸ relates a very pronounced case of traumatic tetanus which he treated successfully by 15 grain doses of chloral hydrate and bromide of potassium, given alternately every hour for 14 days. By that time the opisthotonos had ceased, but some rigidity of the muscles of the chin still remained. The chloral was then discontinued, the bromide being given as before for a month longer. The patient was then cured, but was too weak to return to his employment for six months longer.

Dr. D. Manuel Delfin,³⁹ of Havana, reports the results of the administration of valerianate of quinine in six cases of acute tetanus, founding the indications for its employment upon his belief that the disease is paludal in its origin. Out of six cases, four recovered; one died who was insane and refused treatment; and the other one who died was a very severe case, having once before recovered from tetanus under the use of the quinine treatment. In most cases the more usual remedies—bromides, chloral, etc.—had previously been exhibited without effect. The dose of valerianate of quinine employed at first was one gramme. It is not stated whether this was afterward increased or at what intervals it was repeated.

Austin Meldon,⁴⁰ of the Jarvis Street Hospital, Dublin, read a paper in the section of surgery at the annual meeting of the British Medical Association in Dublin, in August last, in which he contrasted the fatality attending the use of such remedies as nicotine, calabar bean, Indian hemp, curare, quinine, alcohol and opium, with the measurable success which followed the employment of a combination of hyoseyamus, belladonna and conium. Out of 17 cases treated with these drugs, there were 13 recoveries and 4 deaths. The author did not state the fact, which, however, is to be assumed, that the cases were all traumatic and acute. He also observed that since the introduction of antiseptic surgery, tetanus had almost disappeared from the Dublin hospitals.

We reproduce the following statistics of 937 cases which Meldon has collected; although they necessarily lose a great deal of their value from the fact that a very large number of unsuccessful cases are not published, the fatal cases being so common as to present few features of interest:—

NUMBER OF CASES.	TREATED WITH	RECOVERED.	DIED.
370	chloral	83	289
125	curare	23	102
60	nicotine	3	57
96	opium	4	92
21	conium	3	18
76	cannabis indica	12	64
28	bromides	2	26
103	alcohol	25	78
17	belladonna, conium and hyoscyamus	13	4
41	all other drugs	17	24
<hr/> 937		<hr/> 185	<hr/> 754

In the above table no case is included which does not seem to the compiler to have been an acute case. Those cases in which the first symptoms commenced later than the fifteenth day are excluded. All in this table were traumatic.

J. Falconer Murison,⁴¹ of Glasgow, reports a case of traumatic tetanus successfully treated with the hypodermic injection of morphia. The patient, a youth, had been struck in the ankle with a spade, and when first seen by Dr. Murison was suffering intensely and with all the symptoms of tetanus. Thirty grains of chloral with twenty grains of bromide of potassium were given every four hours for three days; tincture of cannabis indica, from 15 minims to $\frac{1}{2}$ a drachm, with inhalations of nitrite of amyl, every 4 hours for 3 days; ice was applied to the spine and chloroform exhibited twice a day for half an hour each time; and finally hypodermic injections of morphine were tried, beginning with one grain and a half, at the end of the second week, then one grain every 4 hours, and continuing its use, but in diminishing quantities, at intervals for about one month. This exhibit offers unusual interest in that morphia succeeded in mastering the symptoms of the case after all the remedies named had signally failed to control any of them.

Mr. J. Montagu Cotterill⁴² is reported as having cured a case of traumatic tetanus by the removal of the cicatrix and surrounding parts.

A man, aged 39, wounded the ball of the right thumb with a piece of broken glass. Twelve days thereafter tetanus set in, and resisted half a grain of the extract of Calabar bean every 4 hours for 4 days. Chloral and bromide of potassium were used continuously for some time; then one-fifteenth of a grain of eserine was administered hypodermically, but such great cardiac depression ensued as to call for free stimulation. No relief following the

eserine, removal of the cicatrix was next resorted to, and with such marked benefit that the patient made a rapid and uninterrupted recovery. Mr. Cotterill himself remarks that the interest of the case centres in the fact that though the operation was delayed for 22 days after the tetanus set in, and though the central nervous system was seriously implicated, the mere removal of the cicatrix effected a rapid cure.

Montagnon⁴³ gives a case of tetanus cured by high doses of bromide of potassium,—from 6 to 20 grammes a day; and J. S. Kennefick reports a case of traumatic tetanus in which, after belladonna and quinine had been employed fruitlessly, hypodermic injections of morphia produced a favorable change in the symptoms; but a consulting physician being called in, large doses of calabar bean and Indian hemp were administered with no appreciable improvement. Resort was again had to morphia subdermal injection, with relief to the patient; but calabar bean was now tried hypodermically in $\frac{1}{3}$ grain doses, and the drug failing to benefit the patient, he died in the night of asphyxia.

Dr. Meyer⁴⁴ communicates a case of traumatic tetanus cured. A young man of 19 years wounded his finger while trying to break a china plate with his hands. On the evening of the third day after the wound, the patient noticed, after being wet through by a cold rain, that he could no longer open his mouth. Subsequently severe symptoms of tetanus showed themselves and Dr. Meyer exhibited bromide of potassium and chloral, 15 grains of each every alternate hour for 14 days; and thereafter, for 4 weeks longer, the bromide alone. On the 48th day the patient was dismissed cured.

James Milner⁴⁵ reports a case of traumatic tetanus which terminated in recovery. After vainly using chloral and bromide of potassium, the author made a deep incision around the cicatrix in the right great toe, with marked advantage to the patient. Subsequently, the bromide of potassium was continued as before, and the chloral was resumed when spasms became more severe. After apparent cure the bromide of potassium was given continuously for other three weeks, during which time out-of-door exercise was allowed.

Dr. T. J. Bennett⁴⁶ relates a case of traumatic tetanus successfully treated by hot water baths. "A stout, healthy colored man, a carpenter about 40 years old, stuck a nail into the plantar surface of his foot during the month of May of last year. The nail was

immediately withdrawn." Some inflammation followed,—enough to cause the patient to discontinue his avocation. During the second week after the accident, at which time the inflammation had considerably subsided, trismus set in, and the case rapidly became one of acute traumatic tetanus. General rigidity of all the voluntary muscles of the body, clonic spasms, opisthotonos, and in fact all the symptoms of a genuine case were present. To combat these symptoms, Dr. Bennett had the patient stripped and put into a large bath of very hot water, and as he became accustomed to the heat the temperature of the water was elevated gradually until the highest possible degree compatible with safety was reached. The symptoms of the disease grew milder, though it was necessary to continue the baths at irregular intervals for three weeks.

Next in order we have a case of tetanus following crushed hand, then amputation of the arm, and finally death. In the service of F. J. Gant,⁴⁷ of the Royal Free Hospital, Mary M., aged 22 years, laundress, was admitted April 28, 1887, with severe injury of the hand, which had been caught between the rollers of a steam mangle. An attempt was made to save the hand, but on the tenth day, she complained of sore throat and stiff neck. Trismus now set in and other symptoms of tetanus appeared. Amputation of the arm below the elbow was done, and the trismus relaxed somewhat. One tenth of a grain of extract of Calabar bean was administered hypodermically; and although the pupils were greatly contracted, no alleviation of the symptoms occurred. Chloroform was exhibited, but all to no effect, for the patient died on the 12th of May in a diaphragmatic spasm. The result of this case induced Mr. Gant to express himself to the effect that under circumstances similar to those in which he found his patient, operative interference can only be advisable for the prevention of tetanus.

Dr. Chas. M. Brown,⁴⁸ of Elmira, New York, thus expresses himself with regard to the treatment of tetanus. Quinine has been in some cases, apparently, used to advantage in enormous doses, some giving as much as 260 grains in one dose. He had himself administered it in doses of 100 grains every hour for some time. This case recovered, and no bad results followed the ingestion of such a large quantity of the drug. Fowler's solution, cannabis indica, morphia, cocaine, the bromides, had in turn been

tried in vain, although the bromide of potassium had been strongly recommended by Dr. McChord, of Kentucky, in 20 grains doses every hour.

Finally, Dr. De Renzi⁴⁹ treats tetanus by perfect rest, by means of which he is able to restore four fifths of his patients to health. The treatment sometimes requires two months, the patient being fed with liquid food through a curved tube. During this time absolute silence must prevail; carpets must be laid, the hinges of the doors oiled, the patient's ears stuffed with cotton wool, and he himself must not make the slightest noise. In fact, no sound must be allowed to reach the patient.

We have thus far given a general synopsis of the remedies employed for the relief and cure of tetanus, all seemingly addressed to the nervous system. We have, of necessity, presented the favorable cases; and an analysis of these would show that amongst them were not a few cases of subacute tetanus. At all events, it will be remembered that while chloral and bromide of potassium seem to have happily controlled the symptoms in a number of instances, the value of such remedies as hyoseyamus or conium must not be lost sight of.

SEPTICÆMIA.

We first notice the statement made by M. G. Daremberg⁵⁰ at a recent meeting of the Paris Biological Society, concerning septicæmia in rabbits. This disease is produced in rabbits by the inoculation of tuberculous matter (lung, lymphatic ganglia) taken from dead bodies in the heat of summer when there is slight putrefaction. Rabbits thus inoculated die within 24 to 40 hours. Some hours before death the animal loses all desire for food, is in a panting condition and depressed; it is attacked with diarrhœa and convulsions; it cries out and drags itself painfully along between the convulsions; is paralyzed, in one or more of its limbs; and sputum mixed with blood issues from the nostrils and mouth.

Necropsy reveals a sero-sanguineous infiltration in the areolar and connective tissues, around the spot where the inoculation was practiced; ecchymoses, slight capillary hæmorrhage on the surface of the intestines; areas of pulmonary apoplexy; hepatic infarction; the spleen enlarged and black; occasionally serous or fibrinous effusions in the peritoneum or pleura; large clots dispersed about,

but more especially in the sinuses of the dura and pia mater; occasionally slight meningeal hæmorrhage, or, in some cases, encephalic or medullary meningitis.

These clinical and anatomo-pathological symptoms are in accordance with those described by Koch in cases of experimental septicæmia with rabbits; with those described by M. Charrin in cases of septicæmia produced through deteriorated blood in charbon; and with those by M. Pasteur in cases of disease inoculated by means of the microbe of saliva. In this he agrees with the results of salivary infection obtained by Sternberg.

The blood and all the organs of animals that have died from this infectious disease contain an ovoid micrococcus, which may be cultivated in veal broth and in gelatine. The latter is not liquefied. Although the micrococci are occasionally dispersed in small rows or zoögleic clusters, and rarely in twos and fours, in successive cultivations they present sometimes one aspect and sometimes another; but the toxic action of the micro-organism is always the same and is equal to the fresh medullas.

M. Daremberg has attempted the Pasteur method of successive inoculation, but without positive results. An absolute method of protective inoculation for septicæmia has yet to be discovered.

Nevertheless, MM. Charrin and Roger⁵¹ claim to have established artificial immunity to septicæmia in dogs. They have studied the effects of the subcutaneous injection of a septic vibrio on dogs, and found that the microbe did not kill them as it did rabbits, but only produced a local lesion. Further, the first inoculation generally conferred immunity on the animal, the dogs operated on, with one exception, becoming refractory to a second inoculation. M. Chanveau states that these results are quite similar to those obtained by him with the microbe of gangrenous septicæmia, which he considers analogous to this septic vibrio.

Alfred Sversson⁵² reports a case of spontaneous gangrene of the whole right lower extremity, with exarticulation and recovery. This case presents few points of interest. The patient, aged 35 years, of intemperate habits and accustomed to rheumatic pains, felt in his right limbs a sudden numbness a couple of days after an attack of rheumatic fever. The temperature of the member fell considerably, a sharp burning sensation seized upon it, and its color became dark and greenish. Soon the limb became emphy-

sematous, and amputation was done just below the middle of the thigh, and without Esmarch's bandage. Upon dissecting the parts after the operation, the femoral artery immediately below Poupart's ligament, was found impervious,—completely thrombolized. Antiseptic dressing was applied, but many sorts of antiseptics were employed. Then great sloughing occurred, large masses of débris were removed; a line of demarkation was established; disarticulation of what remained of the femoral bone was accomplished, but the operator delayed all attempts to cover the large surface of the wound by fresh tissues. The gangrene now ceased and the patient made a fair recovery. It is assumed that the spontaneous gangrene in this case was occasioned by a thrombus in the lower part of the femoral artery. From this case, says the reporter, Dr. Ecklund, Corresponding Editor, we may understand the danger of death to which a drinking man is exposed, who is already the subject of atheroma and who catches a rheumatic fever.

Another case of spontaneous or senile gangrene is reported in the service of Mr. A. G. Miller,⁵³ who showed a leg amputated for senile gangrene of the toes. The operation was performed through the lower third of the thigh, because of the absence of pulsation in the tibial or popliteal arteries. Just where the femoral was cut through a plug was found blocking up the vessel; and a little farther up, where it was found to be pervious, a ligature was applied. Hutchinson advises amputation high up and early in such cases. The patient, a man, was doing well.

Dr. Clarence G. Hollister,⁵⁴ of Union City, Penna., relates a case of senile gangrene complicated with encephaloid cancer of the face, ending in spontaneous amputation and recovery. The remarkable feature of this case was the wonderful work of nature, hampered by the cancerous cachexia and by persistent anæmia from continuous and severe hæmorrhages, in separating the dead from the living tissue and “making an amputation of which the best surgeon might feel proud.” M. B., 60 years old, had a cancerous disease upon his right cheek, which bled so profusely as to endanger life. On October 16, 1886, he was seized with an excruciating pain in the right knee, and extending into the foot and ankle. The foot felt cold and numb; gangrene gradually extended upward and approached the knee joint. The color of the affected part became dark green and a line of demarkation formed about four

inches below the knee. Remarkably slight systemic disturbance followed these changes, and the case ended in an amputation of the soft tissues of the leg and a spontaneous separation of its bones a short distance above the face of the stump. Meanwhile the cancer of the cheek holds its own, and causes the patient much pain and frequent hæmorrhages.

Still a third case of senile gangrene calls for a moment's attention. Dr. Atherton,⁵⁵ of Toronto, tells of a man of 68 years, who about 30 years ago had his left foot and ankle badly sprained and jammed. For many years he had taken spirits regularly, but seldom became intoxicated. While walking in the street he experienced a sudden and severe pain in the left heel and calf of leg which obliged him to ride home. The pain continuing, slight gangrene appeared upon the other second toe, and afterward upon the other four toes. Amputation was advised, but not being agreed to, for three weeks temporizing treatment only was pursued. Finally amputation was done at the junction of the middle with the lower third of the thigh. The femoral artery was found to be a rigid, hard cord, atheromatous and filled with a firm clot. Not a drop of blood flowed from it, although nearly a dozen of enlarged collateral arteries were ligatured. There was union by first intention.

In all these cases, amputation was performed, one of them by natural method; and they all justify the counsel of James, of Exeter, Hutchinson and many others, to amputate when several of the toes and particularly the foot itself, is seized with gangrene.

DYSTROPHIES OBSERVED AS CONSEQUENCES OF RESECTION.

If there be any way of judging of the virtue of a method of treatment, it is surely the study of effects at a period long subsequent; and this is precisely what M. Rochet⁵⁶ proposes to do in a contribution to the consideration of the general results furnished by the operation of resection, notwithstanding that the remote results of articular resection has been already noted by G. Wolff, Gurlt, Loosen, Baraban and Ollier. And what are these trophic troubles? They are those alterations of nutrition which occur in the various organic apparatus, skin and its annexes, muscles, nerves and skeleton. Those which affect the skin are interesting to consider, but interfere but little with the general function of the

member. Not so, however, those dystrophies which seize upon the muscles, bones and nerves.

The author wishes to separate those trophic troubles observed after resection done for wounds by the arms of war, from those met with after pathological resections. The first are frequent, grave and oftentimes incurable; the second are quite different, both as to gravity and evolution. Besides, M. Ollier points out that these dystrophies must not be imputed to resections. We therefore propose to show, in a general way, that resection has nothing to do with the production of these troubles, that they pre-exist before resection, and that they are noticed as well following other methods of treatment or chronic affections of the skeleton and articulations, as after resections.

In reviewing the trophic troubles of different orders established as after resection, we mention the smooth, shining, glassy skin from which the pores and furrows have disappeared, and the color of which has changed to a dark red or even a violet hue. The nails grow apace, become elongated and convex, and appear rather as claws. The hairs grow excessively on the operated side and assume a greater pigmentation. In the vast majority of cases, the function of sweating is exaggerated on the operated side. The opposite condition is rarely met with. The subcutaneous tissue accumulates a great quantity of fat; as usually the swelling and coloring of the skin in atrophied and paralyzed members are occasioned by adipose tissue, and as M. Ollier has said, the accumulation of fat in the cellular tissue takes place chiefly in scrofulous subjects. The growth of the fat commonly affects one segment of a limb: thus, after a resection of the shoulder, it is ordinarily the arm, or its posterior side near the tricipetal region which is the seat of adipose formation. After resection at the elbow, it is again the arm which lodges the fat; and after resection of the knee, the fat localizes at the lower part of the thigh. But wherever it is lodged, the fat tends eventually to disappear when the function of the part is well re-established.

Muscular atrophy is, so to speak, constant in members the seat of resection. "Aside from the primitive traumatic and some orthopædic resections," says M. Ollier, "we meet always in resections muscles more or less atrophied. The constancy of atrophy following resections is not surprising since, independently of the

operation itself, the previous articular lesion which commands the intervention is itself inevitably accompanied with atrophy. With regard to degree, we must make quite a difference between old and recent cases."

In general it may be said that atrophy is more marked near the articulation; thus, in resection of the foot, the leg is more atrophied than the thigh; or in resection of the shoulder, the arm has diminished in volume comparatively with the forearm; and the function of the muscles being less active, the subcutaneous fat accumulates, from not being constantly used by muscular gliding.

The circumference of a member is not the best means of measuring the extent of the atrophy, for the muscles themselves may be smaller and yet quite vigorous in the healthy side. The true way, says M. Ollier, is to measure the force which the muscles can develop in their contractions; but in some persons who had recovered all their muscular power after resection of the elbow, the forearm remained apparently atrophied, the fat was absorbed away, or the muscular atrophy did not persist.

Thermic modifications constitute an interesting chapter in the history of trophic troubles, and it is necessary to distinguish between an objective and a subjective temperature. To appreciate this difference, ask those operated upon with regard to the difference of sensibility as to cold and heat which they have remarked between the healthful member and that operated upon. One patient might complain of cold on the side operated upon, whereas the thermometer might not indicate a real thermal decline. The modification, however, which may be called constant, may be said to be a lowering of temperature; but in a second category of patients, elevation of temperature, subjective and objective, was twice noted.

We then feel obliged to establish two grand classes of dystrophies. The first comprehends a series of trophic troubles which may be called benign; such are the epidermic and ungual alterations, the fat, the modifications of the hairy system and the perspiratory function. In the second category, which includes the thermal phenomena, muscular atrophy, we find, on the contrary, important elements for the appreciation of operative results, such as lesions on the side of the nervous system and of the great vessels, occurring most frequently after resections done for wounds

caused by the arms of war. The three principal causes of the foregoing, says Ollicr, are: the defect in the operative manual, that is to say the ablation of the capsulo-ligamentous apparatus of the primitive articulation; the absence of a regular post-operative treatment; the too considerable height of the osseous portions carried away under conditions in which regeneration is impossible. If then we see often pathological resections well done and such as we have witnessed, benign trophic troubles existing alone and grave dystrophies at their minimum of intensity, we will meet by way of retaliation, after traumatic resections, trophic lesions at their maximum of intensity. And in this connection must be mentioned the bad surgery which may involve such great nerves as the ulnar or radial by section during the operation.

Finally, let us remember that pathological resection, performed after the sub-capsulo-periosteal method, never gives such deplorable results as the traumatic; and far from creating troubles in the circulation or in nutrition, far from diminishing the local temperature, far from creating atrophy in or paralysis of a member, rouses its languishing vitality by putting into activity its muscular functions.

The causes of the gravity of trophic troubles are in no degree dependent upon the operation itself. The muscles have been divided, the nerves destroyed, the arteries torn by traumatism; why, therefore should we be astonished that there exist incurable atrophies or paralyses, or irremediable circulatory lesions?

THE ANAMITE ULCER.

Under the head of surgical pathology, Dr. J. S. L. Morand, Jr.,⁵⁷ calls attention to the Anamite sore which prevails at Tonquin, the phagedenic ulcer of hot countries, as well on account of its frequency as of the long continuance of its treatment, without taking into consideration the operative interventions which it may entail.

The etiology of this affection is somewhat obscure. Can the Anamite ulcer be associated with some trophic trouble produced by the changes in the nerves, the medulla or the encephalon, as Duplay and Morat have claimed for the perforating disease, to which the Anamite sore has many points of resemblance? Dr. LeDantec's⁵⁸ researches lead him to admit the microbial origin of

the disease. However, until better informed, we must admit two indispensable factors in the production of the ulcer: (1) a solution of continuity of the integuments, whatever be the occasion of it,—traumatism, inflammation or burn; (2) a general bad condition, whatever be the cause of it,—scrofula, syphilis, or anæmia. At Nam-Dinh the Anamite sore is far from being uncommon. In 1885 the hospital admissions of Europeans was 8.5 per cent., and for natives, 13.10 per cent. Its duration is very tedious. It has averaged 30.3 days in 1884, and 27.4 days in 1885. These figures give no just idea of the length of treatment of this affection; for after what Dr. Morand saw while attached to the Second Regiment of Tonquinese Sharpshooters, we might double, without fear of exaggeration, the figures given above.

The Anamite ulcer is most frequently seated upon the lower limb; the regions usually invaded are the free extremity of the toes and heel; and Dr. Morand has sometimes, but rarely, met with it upon the trunk and thighs.

We must distinguish three periods in the evolution of this ulcer: (1) A period of beginning: around a mosquito bite, a pustule of erythema, a more or less lively inflammation develops, accompanied almost always with pruritus. A papule now forms, which gives place to a vesico-pustule filled with purulent serosity, or of chocolate-colored sanies. To the pustule succeeds a rounded ulceration with edges made as if with a punch, and rising in relief above the neighboring tissues. At this period, the phagedenic ulcer seems to incommode the patient very little. As for pain, its existence depends upon the region affected. (2) In the second period of phagedenism, a little serous pus runs from the surface of the sore, whose bottom and edges are lined with a grayish layer of changed tissues or of the products of suppuration. Often these ulcers are extremely fœtid. All around the sore the integuments have a violet hue. There is, during this period, of variable length, alternations of better and worse. The depth of the ulcer is apparent only; the lesion hardly goes beyond the dermis and reaches the most superficial layers of the subjacent cellular tissue. Sometimes the bottom of the ulcer is of a wine color, or covered with fleshy granulations lost in patches of pultaceous tissues; and sometimes the surface of the ulcer is absolutely dry. The ulcer extends by the resorption of its edges in the midst of inflamed

tissues. (3) At the end of an uncertain time, it either ceases to enlarge, whereupon the period of reparation begins; or else the phagedenism increases and the ulcer spreads or becomes deeper. In the first case the sore fills up, it spreads out, its borders sink down, and cicatrization proceeds as in an ordinary ulcer. In the other case, all the dermis and adjacent tissues are attacked and at the same time there follow periosteitis and osteitis of adjacent parts. Surgical intervention can now find its place. Relapses are frequent.

Against so rebellious an affection, and of such long duration many treatments have been employed. It is now admitted that a general tonic and reconstructive treatment ought to accompany a local treatment. As for this last, the list of topical remedies shows plainly the little efficacy of the different modes of dressing. Each observer who has written upon the matter has extolled the treatment succeeding best with him. It is thus that by turns the following have been vaunted: powders of cinchona and charcoal; solution of sulphate of copper preceded by a weak solution of chloro-hydric acid as a detersive; antiseptic substances; a strong dilution of carbolic acid; iodoform, calomel or tincture of iodine, followed by the application of strips of drachylon plaster. Finally, Dr. Dantec has quite recently much praised the use of the bichloride of mercury in solution.

Here is an opportunity of testing a high toned eclecticism, and of admitting that, as to dressings, all are good when directed according to a rational method and rational views.

WOUND INFECTION FROM POST-MORTEM EXAMINATIONS.

In an excellent article on the above subject by Albert Abrams,⁵⁹ of San Francisco, Cal., the author begins by declaring that "any suggestion made to the pathologist with reference to the prevention of infection emanating from wounds received during post-mortem examinations, is hailed with delight;" and yet he recommends nothing but that we should be so pedantically antiseptic that we fear infecting the cadaver with an unclean instrument. Along with the transformation of compounds existing in the living body into other compounds by the putrefaction of organic matters, and which changes are undoubtedly attributable to the action of microbes, "certain alkaloids commonly termed

ptoms, are developed, and have been proved to be extremely toxic in their nature." He sustains the view expressed very pointedly by Packard, that wounds received from the fresh subject are usually the most pernicious; and also notices the fact that dissecting wounds have oftener led to disastrous consequences even though the subject had been carefully injected with an antiseptic preparation.

Abrams also insists upon the view of J. O. Hirschfelder, that the condition of our post-mortem instruments is responsible for many intractable wounds.

Another writer, W. Thornton Parker,⁶⁰ in a paper on the prognosis in post-mortem wounds, gives a very sad picture of the action of the poison of the post-mortem wound, extending, like syphilis, until the whole body has become affected; and accompanying a gloomy prognosis, is the statement that there is no reason to suppose that those affected will be able to do anything more than keep the disease in abeyance for the time being. "There it is enthroned in its malignancy and there it will remain until life ceases." Dr. Parker refers, in terms of just admiration, to Dr. Packard's contribution on the subject of post-mortem wounds and quotes his warning of great danger when a wound is received from an instrument poisoned with virus derived from a recently dead person; and that post-mortem examinations of those who have died of certain diseases—especially of puerperal fever, erysipelas or pyæmia—are attended with peculiar hazard. Dr. Parker himself holds the opinion—indeed he is quite sure—that "it is reasonable to assume that the poisonous virus of a recently dead body having been received by post-mortem wound, and having sharply attacked the system, it would be well-nigh impossible to eradicate it." The health is depraved after any post-mortem wound, resistance to the invasion of typhoid fever or severe pneumonia is lessened; while rheumatism, phthisis and other diseases are more readily and quickly acquired, and less readily thrown off than in persons not having been infected. Warts are common, and are known to be very persistent, even with painful sensations. If the prognosis of post-mortem wounds be correct—and it doubtless is so—"it seems," says Dr. Parker, "to be as reasonable to claim that a medical officer, an enlisted man, in the discharge of his duty, who is wounded by a needle or knife at a

post-mortem, and whose health and constitution have suffered thereby, is quite as rightly entitled to pension from the Government for the serious and often permanent injury he has received, as the soldier who is shot in battle or wounded or injured in time of peace." It is not unreasonable to demand a recognition for the injuries of the deadly post-mortem.

An article recently published by Dr. P. Long⁶¹ gives a more hopeful view of the subject; and far from finding topical applications of no use, he speaks most encouragingly of the result of the employment of tincture of iodine. Without detracting from the gravity of poisoning by inoculation from post-mortem wounds, it ought to be well remembered that in a small number of instances the use of injections preservative of bodies destined for dissection, may attenuate, to a certain point, the gravity of the prognosis of anatomical punctures; but it would be too much to claim immunity. The employment of preservative injections as prophylactic treatment is, indeed, very limited; and it is the same for rubber fingers and greasy unguents.

Preventive treatment intended to arrest the absorption of the cadaveric poison—or better, the ptomaines—may be reduced to three principal means: washing, suction and the protection of the wound. Next comes a long list of agents calculated to destroy the poison; such as nitrate of silver, vaunted by some, as Packard, and utterly rejected by others, as Monod and Vidal de Cassis. Cauterization, phenic acid, essence of turpentine, a solution of sulphate of alumina and dilute alcohol, have all been recommended.

After all the remarkable results observed by the author during four years at the Anatomical Institute of the School of Marseilles, following numerous anatomical punctures, he feels that he cannot praise too highly the application of tincture of iodine to the wound immediately after the accident. Supported in his views by numbers of savants with regard to the antiseptic action of the iodine, that it is the abortive action which resides in its antiseptic power, he formulates certain conclusions which he prefaces with the remark that since using the tincture of iodine, no consecutive accident, either local or general, has ever showed itself. He therefore recommends

A. Before beginning dissections or autopsies. (1) to have im-

mediately at hand tincture of iodine in case of an anatomical puncture; (2) to apply it previously in the cracks and crevices which may exist upon the hands of the operator.

B. In case of puncture in dissection, the course to be pursued varies according to the presence of hæmorrhage or its absence. (1) If there be hæmorrhage, let the finger be grasped circularly with the finger and thumb of the other hand, at a point above the wound, placed under a small stream of water, then dried or touched with the tincture of iodine. (2) If there be no hæmorrhage, let the finger be touched with the tincture of iodine, sucked or washed well, and then receive a new application of the remedy. Finally, cover the wound with collodion or oiled silk.

SYMPTOMS IMPUTABLE TO IODOFORM DRESSINGS.

An article with the above title records an experience of the author in a case of horse-bite of the left hand in a coachman aged 34 years.⁶² The patient presented himself at the surgical clinic, where the wound was dressed with iodoform gauze smeared with vaseline, and the whole was enveloped in raw cotton. Three days afterward the epidermis of the entire hand had mortified and was as removable as a glove. Treatment continued. Two days subsequently the same appearance as of a burn showed itself on the other hand. Treatment the same. Four days afterward red patches appeared upon the forearm and the lower part of the arms and upon each plaque were found large flat vesicles. At the same time a rubeolar exanthem appeared upon the anterior part of the thorax and abdomen. The next day, by chance, carbolated gauze was substituted for iodoformed, whereupon, after three days, there was no longer pus in the wound, and after eight days more, the patient went out perfectly cured. This case would be, then, classified under the appellation, iodoform exanthemata, the forms being multiple, as papulous erythema, eczema, eruptions similar to a mercurial exanthem or a scarlatinaform eruption. The symptoms appeared one month after a twice daily dressing of iodoform, as if an instance of accumulation; and M. Dentu observed symptoms after 20 days' treatment. According to the statistics of M. Brun,⁶³ we notice that the intoxication happens 11 times from 10 to 20 days, and 9 times beyond 20 days, after the use of iodoform,

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ANÆSTHETICS.

By HENRY M. LYMAN, M.D.,

CHICAGO.

THOUGH sufficiently voluminous in quantity, the literature of anæsthesia has yielded few additions to the existing fund of knowledge. The subject has been widely discussed, but the discussions have principally consisted in the enunciation of individual opinions which have generally convinced none but their originators. These debates have, however, led to the compilation of numerous excellent summaries that have appeared in various medical periodicals. Best of these, perhaps, are a paper by Miles,¹ of New Orleans, and another by Woods,² of Baltimore.

The physiological action of ether upon the peripheral nerves has been investigated experimentally by Bowditch,³ of Boston, who finds that a nerve which has been impregnated with ether suffers a reduction of its conductivity. In the course of their experiments upon the cerebral circulation, Gärtner and Wagner,⁴ have observed that, when chloroform is inhaled, the immediate effect is an increase of arterial blood-pressure and acceleration of the cerebral circulation. After a few seconds the blood-pressure begins to subside, and sinks to, or even below, the original level. Despite this reduction of pressure, the quantity of blood that flows from the cerebral veins is increased, sometimes as much as three or four times the ordinary outflow, indicating a dilatation of the blood-vessels. If the inhalation be continued the diminution of blood-pressure may reach a degree sufficient to nearly arrest the outflow of blood. Suspension of the inhalation is quickly followed by a rise of pressure and a resumption of circulation.

Ungar⁵ reports, as a result of his investigations, pursued since 1883, that the inhalation of chloroform produces fatty degeneration of the heart, of the diaphragm, and other striated muscles, and also of the parenchyma of the liver and kidneys. He is of the opinion that protracted inhalation of chloroform vapor during

tedious operations may thus produce a state of weakness in which a second inhalation may prove fatal, though the patient apparently tolerates the first inhalation without dangerous symptoms. For this reason he opposes the use of chloroform in normal childbirth.

NEW OR UNUSUAL METHODS OF PRODUCING ANÆSTHESIA.

Hypnotism.—Carl Braun,⁶ of Vienna, is reported to have hypnotized a woman in labor, delivering her without pain in the state of unconsciousness thus induced. Auvard and Varnier⁷ report a similar case.

Ether Drinking.—The anæsthetic properties of alcohol in the form of spirituous liquors have not yet been forgotten (Link of Indianapolis, St. Louis Med. Review); but it is not often that ether is administered internally in quantity sufficient to produce anæsthesia. Ory,⁸ however, reports a case in which a draught containing half an ounce of ether produced sleep for twelve hours, during one-third of which time it was necessary to employ artificial respiration. For several days the urine was very dark brown, gradually returning to the normal color. There was icterus, lasting ten or twelve days; and the lungs were congested. The patient kept his bed for fifteen days, and was confined to the house for three months and a half by persistent anæmia and debility.

Carbonic Acid.—Grehant,⁹ of Paris, finds that by inhaling a gaseous mixture of 100 parts of air, 105 parts (45 per cent.) of carbonic acid gas, and 28 parts (20.9 per cent.) of oxygen, complete insensibility of the cornea may be produced in two minutes. As a consequence of the anæsthesia thus induced, there is a notable reduction of the process of calorification. Animals thus stupefied become so impregnated with the poisonous gas that death, with reduced temperature of the body, may occur even after inhalation of pure air for a time. For these reasons it is certain that anæsthesia with mixed gases, including carbonic acid, is inadmissible.

Nitrous Oxide and Oxygen.—Kreutzmann,¹⁰ of San Francisco, has tried a mixture of nitrous oxide and oxygen gas 10-20 per cent. For this he claims rapid effects, less nausea, and a speedy recovery.

Methyl-chloroform.—This substance has been recently subjected to experiment by Dubois and Roux,¹¹ of Paris. They report that the odor of the drug is agreeable, and not suffocating like that of ether and of chloroform. It burns with difficulty, and is, there-

fore, less dangerous than ether. Its action is quite as rapid as that of ether, and it does not produce the copious salivation that accompanies the use of that drug. Recovery from its effects is very rapid, and followed by no disagreeable consequences. These experiments, however, have only been made upon dogs, and add nothing to what was previously known.

Methylene Bichloride.—Eichholz and Geuther¹² have recently investigated the properties of pure methylene bichloride. They claim to be the first to test its properties upon man,—the article usually known as methylene bichloride being, in England, a mixture of one part of methylene alcohol with three and four-fifths parts of chloroform, and, in Germany, a mixture of one part of methylene bichloride with four parts of chloroform. For the pure article they claim all the advantages of chloroform with less danger of fatal syncope, being in this respect superior to both chloroform and to the mixtures heretofore described as methylene bichloride. Regnault and Villejean,¹³ have found that the administration of pure methylene bichloride produced choreiform and epileptiform convulsions. The substance must be ranked with the more dangerous anæsthetics.

Methylic Ether.—Richardson,¹⁴ of London, recalls to mind his experiments with this gas in 1867. He thinks it may yet be condensed or rendered sufficiently manageable to become useful. Its peculiar value consists in the power it possesses of destroying sensibility without loss of consciousness, and in its great safety.

Bromide of Ethyl.—This substance is still occasionally used. Chisolm,¹⁵ of Baltimore, states that in his own practice it has largely supplanted chloroform, because half a drachm to a drachm is sufficient to produce anæsthesia in half a minute, from which the patient emerges, without nausea, in an equally brief time. He admits, however, that “in many cases if continued a half minute longer than absolutely necessary, it could kill the patient.” Phillips,¹⁶ of Savannah, advises its use in brief operations, especially about the eye, declaring that he has employed it “hundreds of times” without dangerous symptoms. Pauschinger,¹⁷ of Munich, adopts the same opinion. Turnbull,¹⁸ of Philadelphia, thinks that the fatal cases after bromide of ethyl were due rather to phthisis and disease of the kidney in the first two instances, and in the third from not placing a prop between the teeth, from not using

artificial respiration, and from using a mixture of the drug with something else. In other words, it is generally admitted that the substance is very dangerous under those circumstances which are liable to be of frequent occurrence in the extended use of anæsthetics.

Nitrous Oxide.—Nothing has been added to our knowledge of the physiological action of this gas. Many of the details given to the profession in the past have been confirmed by Buxton,¹⁹ of London, and by Hillischer,²⁰ who find that nitrous oxide acts primarily upon the central nervous masses, overpowering the cerebrum first, then in their order, the cerebellum, the spinal cord, the medulla oblongata, and lastly the cardiac ganglia. The great safety attendant upon the inhalation of nitrous oxide in short operations is universally admitted, but a few observers have been distrustful of the sequelæ of the gas. Lafont²¹ asserts that he has seen abortion, chlorosis, epileptic attacks, albuminuria, dropsy, glycosuria, and aggravation of diabetes, all follow the anæsthetic use of nitrous oxide. Brophy, of Chicago, thinks that a persistent tendency to melancholia may be thus evoked.

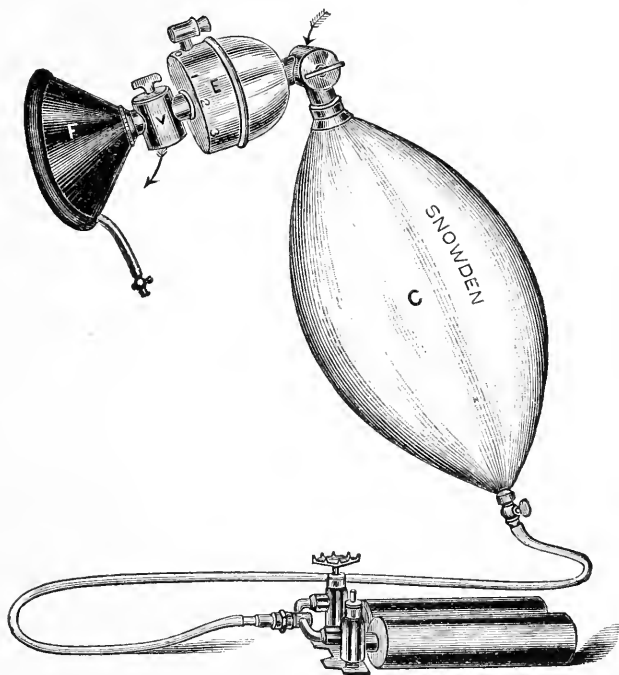
In surgical practice nitrous oxide is generally employed in association with ether, or in combination with oxygen. The English surgeons, chiefly, have brought the first method to perfection. Clover contrived an apparatus by the aid of which the patient was first partially anæsthetized with nitrous oxide gas, for which ether vapor was finally exchanged. The cumbersome character and formidable appearance of this truly British engine has effectually prevented its general use; and, recently, Frederic Hewitt, the experienced London anæsthetizer, has presented an improvement upon the original structure.²²

The use of this instrument is especially recommended by its inventor in dealing with nervous, excitable, muscular or alcoholic patients, who are apt to become uncontrollable under the influence of ether alone.²³

With the view of avoiding the difficulties attendant upon the employment of Bert's method of using nitrous oxide and atmospheric air under pressure, Hillischer,²⁴ a dentist of Vienna, has devised a simple method of administering a mixture of nitrous oxide with ten to fifteen per cent. of oxygen gas. For this mixture he proposes the name of sleeping-gas. Having in less than two years administered it to 2901 patients, of whom the youngest was

3½ years, and the oldest was 82 years of age, the author feels warranted in the assertion that this is the ideal anæsthetic. Under its influence lengthy operations may be performed, and the appearance of the patient is characteristic of natural sleep rather than of anæsthetic stupor. Krentzmann²⁵ modifies the above method by using a mixture of oxygen and the vapor of the A. C. E. mixture employed by Billroth, for which he claims good results.

Choice of Anæsthetics.—The old battle between the partisans of ether and of chloroform has been revived with considerable



HEWITT'S ANÆSTHETIZER.—(*British Med. Journal.*)

vigor during the past year, but without particular advantages to either side. The combat was opened with an assertion by Reeve,²⁶ of Dayton, that the administration of ether “in the human subject may cause death as suddenly, as unexpectedly and in the identical manner that chloroform does.” To this surprising statement Packard,²⁷ of Philadelphia, replied that sudden deaths under ether, according to Reeve’s own showing of cases, almost invariably occurred in patients who were previously enfeebled by age, by loss of blood, by exhausting disease, or by the results of injury, which

had already weakened the hold upon life; while, in a large proportion of the cases of sudden death under chloroform, it occurred in healthy subjects, without loss of blood or dangerous lesion.

The question was next discussed in a paper, before the New York Academy of Medicine, by Gerster,²⁸ of New York, taking the ground that chloroform and ether are both to be employed as useful anæsthetics, each in its proper sphere. This view is generally admitted by the majority of unprejudiced surgeons. But, in the lengthy discussions which followed the publication of this paper, it was evident that too often the choice of an anæsthetic depended upon the individual temperament of the chooser rather than upon scientific convictions. The fearless operator who enjoys an atmosphere of danger, confident in his ability to overcome all difficulties, will make very light of the possible risks attendant upon chloroform. A pallid countenance, a momentary cessation of respiration, a vanishing pulse,—what of that? Can we not always invert the patient, drag out his tongue, electrify his diaphragm, puncture his heart, if need be? In the majority of cases such manœuvres are sufficient; but, when the fatal result does arrive, the conscientious operator would regret the absence of the milder anæsthetic. We may admire, but we should not imitate, the hardihood of a surgeon who persists in administering chloroform to a patient who has narrowly escaped a deathlike syncope only after repeated and prolonged inversions of the body.

The mature opinion of the most experienced men is best presented in the words of Knapp, of New York, who, educated to the use of chloroform in Germany, used that anæsthetic in three thousand cases during the years from 1860 to 1874. Though blessed with immunity from fatal results during these fourteen or fifteen years, he was obliged, about once a month, to use artificial respiration and other measures for the rescue of a patient from impending death. In many other cases alarming symptoms were encountered. Since 1874 he has used ether exclusively, and has thus been relieved from the unpleasant incidents of anæsthesia with chloroform. Hammond,²⁹ of New York, expresses a similar opinion. Hewitt,³⁰ of London, after a wide experience with both anæsthetics, considers the question of comparative safety settled in favor of ether. Yet he admits that there are many cases in which the use of chloroform is preferable. Such are cases of em-

barrassed respiration from pulmonary or bronchial disease without cardiac weakness, the cases of fat, flabby persons who are intolerant of ether, and patients in whom "capillary hyperæmia and venous engorgement would be likely to constitute a serious difficulty or danger."

The conclusions, therefore, regarding the choice between ether and chloroform, may be thus formulated:—

(1) Ether is contra-indicated in cases of nephritis on account of the renal hyperæmia that it produces.

(2) Ether is contra-indicated in the chronic bronchitis of the aged, or of the very young, and in extremely feeble persons. A large proportion of the fatal cases under ether have occurred in persons suffering with malignant tumors, with strangulated hernia, or with extreme prostration.

(3) Ether is contra-indicated in cases that resist its anæsthetic effect. Such patients as do not yield promptly to ether suffer the agonies of partial suffocation without loss of consciousness, perhaps even for an hour before becoming insensible. For these, chloroform is the better anæsthetic.

Chloroform is indicated (1) in young children whose narrow air passages may become easily clogged with mucus.

(2) Chloroform may be used in child-birth.

(3) It is preferable in cases that are unmanageable under ether.

(4) In cases which must be subjected to operation shortly after meals, when it is desirable to avoid vomiting.

(5) Also in cases requiring operation upon the respiratory passages.

Preparation of the Patient for Anæsthesia.—Some surgeons³¹ who use chloroform still think well of the administration of three or four drachms of aromatic spirits of ammonia, or of fifteen grains of the sesqui-carbonate, within an hour of the inhalation, in order to sustain the vigor of the heart. All are agreed that the mouth should be examined before the commencement of inhalation, for Rilpol,³² of Lyons, reports a case in which the patient was nearly suffocated by the displacement of a set of artificial teeth into the pharynx.

Administration of the Anæsthetic.—E. Paul Boncour,³³ of Paris, contributes an interesting article on the mode of administering chloroform. He thinks that French chloroform is stronger

and more reliable than the product of Scotch manufacture. Much must be allowed, however, for national partiality in such matters, for we find, in like manner, a German surgeon insisting that he could obtain no satisfactory results with French cocaine. In the administration of chloroform, Boncour discards all inhalers, and uses only a folded handkerchief just large enough to cover the mouth and nose. The nose and chin should be protected from the irritant vapor by an application of simple cerate, or other oily substance; the patient must lie at full length; all the usual provisions and preparations must be duly regarded; the chloroform must then be dropped, to the extent of four or five drops, upon the handkerchief which, with the thumb and finger of one hand must be closely applied to the root of the nose, while with the other hand the opposite border is raised lightly above the lips and chin. The chloroform is replenished, as fast as it is consumed, by the aspersion of six or seven drops at a time upon the handkerchief. In this way anæsthesia will be induced in the course of fifteen or twenty minutes without excitement or irritation. By this method the condition of the pupils, the color of the face, the character of the pulse, and the state of respiration can be readily observed. It is said³⁴ that in Munich chloroform is administered by dropping upon a small mask of cloth stretched over a wire frame just large enough to cover the mouth and nose. The same method is common in Vienna and elsewhere in Europe.

Administration of Ether.—People of an inventive turn of mind still occupy themselves with the introduction of new inhalers. Hobbs,³⁵ of Richmond, Indiana, proposes an instrument for the administration of warm ether vapor, which differs in no important particular from Clover's small ether inhaler. Lloyd,³⁶ of the West London Hospital, calls attention to the uncleanness of Clover's apparatus, and suggests the possibility of tubercular infection through the use of an infected inhaler. Porritt,³⁷ of Huddersfield, proposes to avoid this risk by dispensing with the India rubber bag into and out of which the victims of Clover's method have been compelled to breathe. This dispensation, however, does not protect the inhaler itself. Dumont,³⁸ of Bern, Switzerland, avoids the whole difficulty by administering ether from a clean compress supported before the face by a magnified Skinner's chloroform mask. Parkinson,³⁹ of California, proposes a modification of

Ormsby's inhaler, which is probably as good as any such thing ever can be.

Evidences of Complete Anæsthesia.—Eugene A. Smith⁴⁰ considers the ordinary rules, as laid down in the books, either insufficient or too sweeping. He advises to “abolish the reflex muscular movements of the trunk, then push the agent to dull conjunctival sensibility until reflex contraction of the orbicularis (palpebrarum) are slight and to cause the pupils to contract.” Boncour⁴¹ is more lucid. He counsels careful observation of the eyes, which indicate complete anæsthesia when the pupils are thoroughly contracted, and do not dilate if the skin be pinched, or if the cornea be lightly touched. Mere insensibility of the cornea alone is insufficient evidence of complete anæsthesia. Hewitt⁴² thinks the disappearance of the pharyngeal reflex, *i.e.*, the act of deglutition excited by the presence of mucus or ether vapor in the pharynx, is a more trustworthy proof of complete anæsthesia. Such acts of swallowing indicate that more of the anæsthetic should be given; for if an insufficient narcosis is maintained, such reflex acts as swallowing, coughing, retching, and vomiting will be likely to occur, especially when ether is given.

The occurrence of dilatation of the pupil during complete anæsthesia is a symptom of great danger. This opinion is now universally admitted. But McLeod,⁴³ of Glasgow, believes that the movements of the pupil need not be watched with the care that should be directed to observation of the face and lips. Sudden pallor, labored or stertorous breathing in his experience, form the most certain indications of danger. Neilson,⁴⁴ of Glasgow, has reviewed the whole subject, and decides that the observations of Budin and Coÿne⁴⁵ are for the most part correct. His conclusions are:—

1. “The effect produced by chloroform on the pupil is a first dilatation, then contraction as the narcosis becomes more profound, and dilatation again when sensibility is returning.” If with the pupil strongly contracted and motionless, the administration be still continued, the pupil will again dilate, but now more suddenly and completely. It is the dilatation of asphyxia, from which resuscitation is difficult or impossible.

2. So long as the pupil dilates in response to a pinch, or other painful irritation of the surface, narcosis is not sufficient, unless

the proposed operation be so slight as not to require complete anæsthesia.

3. Complete contraction and immobility of the pupil under reflex excitation requires the suspension of chloroform until dilatation begins again.

4. If sickness occur, the pupil dilates more rapidly than when sensibility alone is returning. Vomiting serves to awaken the patient.

Neilson's second conclusion needs the additional qualification that operations during partial anæsthesia are to be avoided, especially if chloroform be used, because of the greater liability to fatal syncope from reflex inhibition of the heart, under such circumstances. Reeve,⁴⁶ of Dayton, Ohio, has recently added another to the list of cases which have thus terminated fatally during slight operations. His patient died suddenly during an exploratory puncture of the liver without anæsthetics. Complete anæsthesia would probably have saved life in that instance.

Anæsthesia by Chloroform during Sleep.—Stevens,⁴⁷ of Cincinnati, reports the case of a boy, four or five years old, who had received an extensive scalp wound. Taking advantage of the occurrence of natural sleep after the injury, chloroform was cautiously administered till the patient was completely anæsthetized, when the wound was dressed without waking him. Parham,⁴⁸ of New Orleans, also reports the case of a boy, six years old, who was suffering from pleurisy with effusion on the left side. He was successfully anæsthetized with chloroform during sleep, for the purpose of aspirating the pleural cavity. But on a subsequent occasion, when it became necessary to repeat the operation, it was found impossible to chloroform the patient during sleep. He seemed to sleep less soundly, and to be more easily roused than when the attempt was first made.

Chloroform in Midwifery.—It seems hardly necessary to make more than a passing allusion to the use of chloroform in midwifery. During the past year the discussion of anæsthetics has given opportunity for many of the veterans of the profession to reiterate their confidence in this method of mitigating the pangs of childbirth. Burge,⁴⁹ of Brooklyn, Fordyce Barker and Partridge,⁵⁰ of New York, have voiced the opinion of the majority of obstetricians in favor of the moderate use of chloroform to dull

the intensity of pain during long and agonizing labors. The opinion of Ungar,⁵¹ however, should not be overlooked in this connection.

Heart Disease no Bar to the Use of Anæsthetics.—It is generally admitted that chloroform should not be used when the heart shows signs of debility or disease. But the stimulating effects of ether render its use safe in many such cases. The case of the late Dr. Wilson Fox,⁵² illustrates the supporting action of the drug when used by hypodermic injection. The doctor suffered with cardiac dyspnoea, syncope, and great prostration consequent upon a damaged condition of the cardiac valves produced by an old endo- and peri-carditis. His dyspnoea and pain were completely relieved by the subcutaneous use of ether. The Philadelphia County Medical Society has also recently recorded its opinion that “the administration of ether is not only necessary and proper when pain is to be inflicted upon patients with cardiac lesions, but lessens the dangers incident to operations; provided that due care be taken during the administration of the anæsthetic, and proper regard be paid to its after effects.” This does not mean that such operations are devoid of danger. Hewitt⁵³ mentions several cases of death from operations for large aneurisms near the heart, in which the anæsthetic no doubt contributed to the fatal result. In one case the anæsthetic was chloroform, diluted with only one-eighth part of ether. So the fatal termination was not to be wondered at. In another case ether was used, but the patient did not rally, and died thirty hours after the operation. In a third case (innominate aneurism) with “urgent dyspnoea on lying down, and stoppage of respiration after a few inhalations,” the kind of anæsthetic is not mentioned. In all these cases the urgency of the symptoms required operation, so that some anæsthetic had to be used, even though it, like the surgeon’s knife, might certainly add temporarily to the danger of the patient.

Use of Atropine and Morphine with Anæsthetics.—This method of fortifying the heart against the depressing effects of an anæsthetic has been widely indorsed by the highest authorities. But Hewitt,⁵⁴ believes that the effect of morphine may frequently serve to enfeeble respiration, and thus to bring on a fatal result which might have been escaped if morphine had not been used. He quotes the statement of Filchne that “when chloroform or

ether is inhaled by dogs to whom morphine has been previously given, Cheyne-Stokes breathing results." This indicates the commencement of respiratory failure. He also relates the particulars of a case of operation for the removal of a cerebral tumor, in which death appears to have resulted from the hypodermic injection of one-third of a grain of morphine before the inhalation of chloroform. In this case artificial respiration had to be maintained for four hours. At the end of this time automatic breathing commenced and continued about two hours longer, when the patient died without ever regaining consciousness.

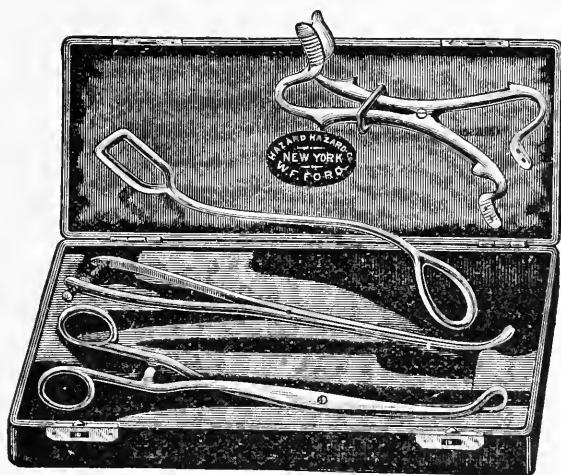
Sequelæ of Anæsthesia.—Some of the dangerous sequelæ of anæsthesia have attracted attention during the past year. Gerster has emphasized the most of them in his notable paper before the New York Academy of Medicine. Wilson,⁵⁵ of Baltimore, reports a case of violent gastritis following inhalation of chloroform for the relief of precordial pain. Inhalation of ether has been credited with the production of pneumonia or severe bronchitis in a considerable number of cases. Sexton, of New York,⁵⁶ reported to the Practitioners' Society a case of vomiting, after ether, "that persisted for days, attended by vertigo and difficulty in walking. The patient had been an epileptic, and was anæmic." Other members of the society had seen no such cases. Bull, of New York, stated in the course of the debate that vomiting of that character was more common after chloroform than after ether.

Emmett, of New York, again calls attention to the supposed danger of nephritis after ether inhalation. But Weir, of New York, Rohé,⁵⁷ of Baltimore, and others, do not think the danger sufficient to forbid the use of ether in cases requiring anæsthesia. As a matter of fact, ether does cause temporary hyperæmia of the kidneys; but those organs are seldom sufficiently diseased to render such determination of blood dangerous.

Insanity following the use of anæsthetics has been noticed. Bull mentions such a case. The well known alienist, Savage,⁵⁸ of London, read a valuable paper on this subject, at the fifty-fifth annual meeting of the British Medical Association. He calls attention to the fact that, in persons who are predisposed to insanity, intoxication with vegetable, mineral, or organic poisons, and the use of alcoholic or anæsthetic inhalations may be followed by acute delirious mania, from which the patient may recover, or

may lapse into dementia, or even into the progressive paralysis of the insane. These conclusions are based upon a number of interesting observations which agree with the facts recorded by Crothers and others who have written upon inebriety. Savage utters a word of caution against the use of chloroform during childbirth, when a predisposition to insanity exists, for in this way puerperal insanity may be excited. He also records a case of mania, followed by dementia, after nitrous oxide, thus agreeing with the opinion of Brophy, previously noted.

Death from the Use of Anæsthetics.—Recognizing the fact of death as an occasional sequel to anæsthesia, Liel,⁵⁹ of New York, has devised a valuable set of instruments with which to oppose the



LIEL'S EMERGENCY CASE.—(*New York Med. Journal.*)

onset of dangerous symptoms during inhalation. There is a mouth-gag, a sponge-holder, a tongue-depressor, and a tongue-forceps. A small electrical battery, a trocar for cardiocentesis, and a small tackle for inversion, are all that seem additionally needed to assure the tranquillity of the most timorous patient.

Puncture of the Heart in Dangerous Chloroform Narcosis.—At the annual meeting of the American Surgical Association, in May, 1887, Watson,⁶⁰ of Jersey City, reported the result of experimental puncture of the heart in sixty cases of death from chloroform in his laboratory experiments upon dogs. The punctures were: In the right ventricle, thirty-eight; left ventricle, six; right auricle, six; superior vena cava, three; inferior vena cava,

two; apex of the heart, two; not stated, one. The resuscitations after puncture were: right ventricle, nine; right auricle, one; punctures of the vena cava produced fatal hemorrhage into the thoracic cavity. Auricular puncture produced considerable hemorrhage into the pericardial sac. Ventricular puncture caused very little or no hemorrhage. From these experiments the author concludes:—

“*Firstly*: The puncture of the heart, especially of the right ventricle, stimulates the muscular contractions, and may be advantageously employed in the treatment of this morbid condition.

“*Secondly*: The best results are obtained when abstraction of blood from the cavity of the ventricle is combined with the stimulating effects produced by the entrance of the aspirator needle.

“*Thirdly*: The puncture of the right ventricle is a safer and more efficient operative procedure than the puncture of the right auricle.”

During the debate on this paper, Kinloch, of Charleston, S.C., mentioned a fatal case under chloroform in which heart puncture was unsuccessfully tried. A parallel case is reported from England.

STATISTICS OF MORTALITY FROM ANÆSTHETICS.

The past year has yielded no progress in the collection of trustworthy statistics regarding the mortality from anæsthetic inhalations. This will never be accomplished until public institutions uniformly register and publish all their cases of surgical anæsthesia, with the results.

Wylie,⁶¹ of New York, during the debate elicited by the paper of Gerster, reported two deaths from ether in his own practice; one was an umbilical hernia in a very fat person, and the other a case of abdominal tumor, in which, before the operation, the urine gave no evidence of kidney disease, but the autopsy revealed chronic interstitial nephritis, with an acute attack.

Abbe, of New York, also, on the same occasion, reported a death from ether, in a case of compound fracture of the leg, with tetanus. The patient died under ether, upon the table, in a state of general tetanic rigidity.

The cases referred to by Hewitt, have already been related.

Agnew,⁶² of Philadelphia, reports a death under ether inhaled for an operation for hemorrhoids. The patient was a man forty-

five years of age. Respiration ceased during the operation, but the heart continued to pulsate for twenty-five minutes longer. The autopsy revealed collapse of the lungs, traces of an old meningitis, and a calcified blood-vessel which had ruptured in the floor of the fourth ventricle at the respiratory center. The heart and kidneys were healthy.

An English case is reported,⁶³ where a woman, forty-five years of age, died under ether during an operation for the removal of a cancerous breast. Ether was administered with Clover's inhaler, an instrument that produces asphyxia as well as anæsthesia. The combination of malignant disease, anæsthesia and asphyxia, is always particularly dangerous.

Deaths from Chloroform.—The majority of medical publications seem to feel little interest in the matter of recording deaths during surgical anæsthesia; consequently, their registration is very incomplete. The following list probably indicates only a small part of the mortality from chloroform during the past year:—

1. Male, æt. 35, suffering from right-sided empyema, was aspirated under chloroform, but sank and died from asphyxia.⁶⁴

2. Male, æt. 14, three months previously had undergone an operation for the removal of diseased bone from the foot. The disease recurred; chloroform was administered, the operation was half finished, when the heart stopped. Autopsy discovered no internal disease, only congestion of the liver and lungs incident to the inhalation.⁶⁵

3. Male, æt. 30, necrosis of metacarpal bone, chloroform, fatal syncope during the operation. Heart slightly fatty.⁶⁶

4. Male, death under chloroform.⁶⁷

5. Female, death under chloroform.⁶⁸

6. Male, chloroform given for reduction of a dislocated shoulder, fatal syncope at the moment of reduction. No autopsy.⁶⁹

7. Male, false ankylosis of the wrist. Partial anæsthesia. Fatal syncope. Fatty heart, cirrhosis of liver and kidneys.⁷⁰

8. Death from chloroform in the Gloucester Infirmary.⁷¹

9. Female, æt. 41, left-sided pleurisy with effusion. Puncture. Fatal syncope. Heart fatty.⁷²

10. Male, æt. 54, death under chloroform. An ounce of brandy had been taken three-quarters of an hour before the chloroform.⁷³

11. Male, æt. 32, submaxillary tumor, chloroform; sudden rigidity of the body. Fatal syncope. Gerster's case.⁷⁴

12. Male, æt. 30, about to be operated on for sciatica. Ether was given, but did not produce anæsthesia. Chloroform was then administered, with an immediately fatal result.⁷⁵

13. Male, æt. 45, epithelioma of the tongue. Chloroform. Fatal syncope. Heart, fatty; aorta atheromatous; lungs emphysematous; other organs healthy.⁷⁶

14. Male, æt. 28, pleurisy with effusion; Sept. 15th, 4 pints of serum were withdrawn by aspiration. Sept. 20th, 3 pints more. Oct. 17th, $5\frac{1}{2}$ pints of pus were evacuated. Oct. 18th, the chest wall was freely opened under chloroform, to permit free drainage. Sudden fatal syncope.⁷⁷

As an offset to these cases should be mentioned the remarkable experience of Hunter McGuire,⁷⁸ who, during his service as medical director of Stonewall Jackson's Confederate Army Corps, saw twenty-eight thousand chloroform administrations without a single death. Nussbaum is said to have seen forty thousand similar administrations in war without a death. Chisolm⁷⁹ reports fifteen thousand administrations without a death; but he has subsequently admitted the occurrence of the usual number of alarming instances of deathlike syncope.

Accidents from the A. C. E. Mixture.—Despite the numerous objections that have been so often urged against this mixture, it is still used in certain quarters. Winslow,⁸⁰ of Baltimore, was impressed with the objectionable mode of its administration in Billroth's clinic in Vienna, where a patient had died while inhaling the vapor in an upright position. Sharp,⁸¹ of Volcano, West Virginia, relates two cases in which the use of this anæsthetic very nearly caused a fatal result. Armstrong,⁸² of Canada, and Walters,⁸³ of Reigate, Eng., praise the article; but Craddock,⁸⁴ of Bath, Eng., who, for many years, employed chloroform, then for a series of years the A. C. E. mixture, finally discarding them both for ether, declares that his experience has satisfied him of the superiority of ether in all operations that require more than a few seconds of time.

Local Anæsthesia.—Corning,⁸⁵ of New York, advocates the use of tourniquets to the limbs of patients about to receive an anæsthetic, so as to limit the circulation of the drug to the head

and trunk. By this method the induction of stupor is hastened, and the whole mass of the blood does not become intoxicated. The recovery of consciousness is also greatly accelerated by the return of the uncontaminated blood to the brain when the tourniquets are removed. Sweetnam,⁸⁶ of Toronto, Canada, thinks that equally good results would be procured by the use of simple ligatures around the limbs, but a little consideration shows the superiority of the other method. But the utility of this process will probably be limited to cases of ether inhalation, for Corning has shown that anything that tends to produce extensive blood-stasis also tends to favor the occurrence of syncope, thus adding to the danger of artificial anæsthesia.

Corning has also recommended in cases where limited local anæsthesia is desired, to first render the part anæmic by pressure upon the skin with a shield of wire gauze. A refrigerating spray then directed through the gauze upon the bloodless skin produces rapid anæsthesia of the part.

Local Anæsthesia by Vibration.—Brimmer,⁸⁷ of Minneapolis, finds that the sensibility of the pulp of a sound tooth may be overcome "by holding a rapidly revolving spear-shaped drill in contact with it for fifteen or twenty seconds, so lightly as only to transmit the vibration."

Local Anæsthesia by Irritation of the Skin of the Neck.—Brown-Séquard⁸⁸ finds that in animals, especially monkeys and dogs, an incision in the skin over the larynx will destroy cutaneous sensibility over two-thirds of the front of the neck.

Local Anæsthesia with Spray of Methyl Chloride.—Bailly⁸⁸ uses the spray directed upon a piece of lint laid over the skin of the affected part, for the relief of pain, or for the production of limited surgical anæsthesia.

Local Anæsthesia with the Resin of Piper Methysticum.—Lewin,⁸⁹ of Berlin, advocated the use of this substance as an article similar to cocaine; but Filehne,⁹⁰ of Breslau, shows that it is of very trifling value.

Local Anæsthesia produced by the Benzoyl Derivatives.—Filehne,⁹¹ in the course of the above research, has ascertained that benzoyl-tropine is a powerful local anæsthetic, exercising upon the pupil and ciliary muscle the same effect that is produced by all the tropines. Other benzoyl compounds possess a similar anæsthetic

property. The strongest is Benzoyl-methyl-triaceton-alkamine; then comes benzoyl-quinine; weakest of all is benzoyl-morphine. With the exception of benzoyl-tropine, these substances cannot be used about the eye, because of the painful burning sensations which they produce. Benzoyl-tropine acts very much like atropine, and is too expensive for use in place of cocaine.

Local Anæsthesia produced by Cocaine.—At the session of the Paris Academy of Sciences, December 19, 1887, Lafont,⁹² of Paris, read a paper on the physiological action of cocaine. This substance increases the functional activity of the sympathetic nervous system, causing contraction of non-striated muscular fibres wherever they are subjected to the effect of the drug. It also paralyzes the end-organs of the sensory nerves, thus exercising upon the sensory apparatus an effect analogous to that of curare upon the motor nerve end-organs. The local effects of cocaine have been considered in an article on another page.

Local Anæsthesia from Menthol.—This substance⁹³ is useless for the relief of acute pain. Rosenberg has used it often in place of cocaine about the pharynx, but its effect is too evanescent for practical utility.

Local Anæsthesia from Drumine.—Reid,⁹⁴ of Australia, having published a statement that the active principle of *Euphorbia Drummoudii* was a powerful anæsthetic, Ogston,⁹⁵ of Aberdeen, experimented without success upon a specimen of the article described under the name of drumine. So complete was the lack of anæsthetic properties that it was conjectured that possibly the substance had become decomposed during its transport from Australia.

Local Anæsthesia from Gleditschine or Stenocarpine.—Clairborne,⁹⁶ of New York, narrates the introduction of this alleged anæsthetic, a specimen of which he had received from Dr. Allen M. Seward, of Bergen Point, N.J., who had received from a veterinary surgeon, named Goodman, a quantity of leaves from a Southern tree that were said to produce local anæsthesia in the horse when applied in the form of a poultice. The tree from which the leaves were procured was at first supposed to be the *Acacia Stenocarpa*, hence the supposed alkaloid was called *Stenocarpine*; but further research led to the adoption of *Gleditschia Tricanthus* as the parent source, and the anæsthetic was named

Gleditschine. Claiborne, Knapp, Jackson,⁹⁷ of Philadelphia, and others, made numerous experiments with the drug that had been furnished to them. Its anæsthetic properties were unquestionable and admirable, promising results equal to any that had been observed after the use of cocaine. But the similarity of its effects to those produced by cocaine and atropine speedily aroused suspicion. Marshall,⁹⁸ of the University of Pennsylvania, and other analytical chemists, soon reported that the alleged novelty was nothing but a mixture of cocaine and atropine with a sufficient quantity of salicylic acid to prevent fermentation. The original discoverers of this precious compound have promised an exhaustive investigation, but thus far nothing has transpired.

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SURGICAL DIAGNOSIS.

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In the analysis of a case of surgical disease, the line of inquiry should be both general and special. Under the head of the general, a historical or biographical narrative of the life of the patient, past and present, should be obtained. This would include age, sex, social condition, residence, occupation, habits, mental and moral states, duration of disease,—all to be gleaned either from the patient, or partly, it may be, from his or her friends. Under the head of the specific is included all the information which can be acquired by the testimony of the senses.

GENERAL INQUIRY.

Age.—The age of the patient becomes a very important factor in the consideration of disease. The nervous system of the very young is peculiarly irritable; and this susceptibility to different stimuli imparts a coloring to the diseases of infantile life. A slight indisposition is frequently accompanied by high febrile or cerebral excitement. An inflamed gum during dentition or a tight prepuce will often throw into convulsions the entire muscular system. A pain in the knee, which in the adult might attract little if any notice, in that of a child would suggest at once the probability of disease in the hip. It is during this period of life that so many manifestations of struma crop out. A morbid growth in the neck will likely prove to be an adenoma, rather than a cyst, a sarcoma, or a fatty neoplasm. Abdominal pains or a grunting respiration in a child will suggest disease of the spine; in an adult only some error in diet or intercostal neuralgia. A brassy cough in a child creates an apprehension of croup; in a person of adult years it is esteemed an ordinary cold. In estimating the effect

of forces applied near to the articulation of the long bones in childhood and adolescence, the question of epiphyseal separation will have to be considered,—an accident which could not occur in mature or advanced life. Vesical irritation in children would be referred to one of two causes,—stone in the bladder or phimosis; in an adult the probable existence of stricture, prostatic disease, hæmorrhoids, fissure and cystitis would enter into the inquiry.

Sex.—Between the male and the female there exist differences so radical—mental, physical and moral—as to be patent to the most superficial observer. It is the supremest folly to imagine that men and women are constitutionally fitted for a unity of occupation. When the dream of enthusiasts is realized, women will cease to be women in all those endowments which confer on them grace and dignity of character. The sexual system of woman is the centre about which revolve all the forces of her being, and is projected as a modifying factor into all the morbid processes peculiar to her sex. The diseases, functional and organic, based on her peculiarities of organization, are legion. Among them may be mentioned hysterical convulsions, hysterical blindness, false paralysis, irritable bladder; and, as she approaches the culmination of child-bearing life, carcinoma of the uterus, uterine fibroids, mammary cancer, etc.

Contrast these maladies with the common affections of the male: hysterical and hysteroidal phenomena almost unknown; carcinoma, when occurring, usually epithelial in character and located on the hip or in the rectum. If articular trouble is complained of, it is not mimicry, but real inflammatory attacks,—rheumatic or otherwise. A convulsion in the male means something serious; there is a substantial reason for its existence: the brain is suffering. If he has paralysis, there is no dissimulation in the case. There is either intracranial or intraspinal lesion; and when vesicular irritation is present, it is usually traceable to hypertrophy of the prostate, stone, cystitis or stricture.

To pursue the comparison further, we may note one or two conditions common to both,—for example, hernia. In females, the femoral variety predominates; in males, the inguinal form. Disturbances of the heart and arteries are common to both men and women. With the former, there are usually the evidences of atheroma, aneurism or valvular disease; with the latter,

they are likely to be reflex in their origin, and to emanate from the direction of the pelvic organs or from the stomach. While all this is true, the exceptions to the rule are sufficiently common to make it imperative on the part of the physician to give the same thorough consideration to the one as to the other,—as it has not unfrequently happened that women have fallen victims to disease which, had it been detected and treated at an early period, might have been prevented from terminating fatally. These are sad surprises, and should warn the surgeon against allowing any mental prepossession to warp his judgment when the problem of disease is to be solved.

Occupation constitutes another important element in diagnosis. It is a fruitful predisposing cause in many infirmities. The operators in sand-paper factories, where the air is filled with fine, needle-pointed, and angular particles of silicious dust, soon begin to suffer in the respiratory organs. The matchmaker is exposed to necrosis of the jaw from the fumes of phosphorus; the housemaid frequently suffers from enlargement of the patellar bursa from her posture in scrubbing; the painter is liable to have lead colic; the laborer operating in damp localities is particularly prone to rheumatism; while draymen, carters and stevedores, called to make great muscular exertion and raise heavy weights, are predisposed to aneurism and cardiac disorders. There are instances of deformity—for example, spinal curvature and the loss of bilateral symmetry in the extremities—which are determined by occupation, and are therefore not pathological. The shoemaker over his lapstone and the tailor on his table are examples of the former; and the man constantly working a foot-lathe supplies an illustration of the latter.

Habits.—Many of the diseases which the surgeon is called to treat have their origin in individual habits; and when once possessed of a knowledge of these, many phenomena otherwise difficult to understand become at once intelligible. Abdominal ascites depends upon a variety of causes; but when it becomes the subject of diagnosis in a person who has been habitually using alcohol, the liver will be the first organ suspected. Urethritis does not depend upon a single cause; but if the patient is known to lead a loose and dissolute life, the specific character of the disease will certainly be assumed. Sexual impotency arises from varied causes; but if the subject has been leading a loose life, it will be attributed most

justly to venereal excesses. Syphilitic manifestations usually are acquired by impure connection; but a virtuous woman or a pure-minded nurse may suffer and be blameless when it is discovered that the lover of the first had mucous patches on the lips or mouth, and that the latter had been nursing the newborn infant of syphilitic parents. Certain disturbances of the heart and certain visual defects, were it not known that the patients were excessive tobacco smokers, would lead to a grave prognosis. There are lesions on the generative organs which in their characteristics are so near the border line of the inflammatory and the specific, that their true relationship can only be predicated on a knowledge of the habits of the patients; and there are perturbations of the nervous system which are the outcome of secret vices, common to both sexes, the management of which can only be successfully conducted when the real causation is known.

Mental and Moral States.—The functions of the body are influenced by mental and emotional causes to an extraordinary degree, as every experienced professional man very well knows. Unless this action and reaction is recognized, many symptoms would be very misleading indeed. While both sexes furnish examples of this power of mind over matter, yet it is the female who, in virtue of her peculiar organization, presents the most common and typical illustration of this statement. Food taken into the stomach of a patient who is about to undergo a surgical operation, will remain for hours undigested. A mercantile crisis will develop a host of irritable bladders, insomnia, hepatic and gastric disorders. Extreme solicitude, anxiety and grief will arrest the secretion of the different glandular organs; a sudden shock has developed a heart murmur; and disappointed hopes, or hope deferred, not only "maketh the heart sick," but the body also by interfering with the functions concerned in nutrition. These are not the cases requiring physic, but time and cheer and change.

In striking contrast with these miserable, unhappy souls, who go bowed down like the bulrush, is another class, the individuals of which, possessing active imaginations, are always living in an atmosphere of exaltation, and are prone to give an overwrought and unreal coloring to their symptoms.

Antecedent History.—By this we are to understand the acquisition of such knowledge concerning progenitors as may tend

to throw light on the disease of their successors. The transmission of disease from generation to generation is just as true as the perpetuation of family resemblances. Sometimes this passing down of bodily or mental disabilities is not in unbroken succession. The children may be disinherited and the grandchildren fall heirs to unwelcome legacies, just as grandchildren not infrequently resemble their grandparents more closely than their parents. It is true, many patients try to conceal this very necessary information from the practitioner, or do not consider it wrong to misrepresent. The value of this knowledge is particularly felt when the question of a change of climate is to be considered in connection with pulmonary complaints, or in forming a diagnosis in regard to neoplasms of doubtful character.

Individual History.—Forewarned, forearmed. Knowing the personal peculiarities of organization, a course of preventative therapeutics can be formulated by which many physical ailments may be escaped. The personal history is associated with what we call temperament. Take for illustration an individual in whom the vascular system predominates,—indicated by a strong heart, full bounding pulse, active capillary circulation, a florid complexion and habitual warmth of the body. Such an one is said to possess a sanguineous temperament, and will be liable to suffer from acute inflammatory attacks; and, aware of such tendency, the surgeon will be ever on the outlook for complications of this nature in sickness or injury. Another person will present constitutionally a different make-up. The action of the heart will be languid or slow, the sensibility obtuse, the complexion dark, and the movements, both of mind and body, characterized by deliberation or slowness. These constitute the phlegmatic temperament, and the owner endures suffering without complaint, is rarely demonstrative, and may, on this account, leave a false impression on the mind of the unsuspecting surgeon, even when suffering from a disease of the gravest nature. Persons of this temperament are said to have staying or enduring qualities, or “pluck,” when in truth they are cast in a coarser mould than others, and consequently do not experience to the same degree acute suffering.

There are others again who possess the nervous temperament: they flush on the slightest excitement, are restless, ever in motion, their movements quick, their behavior under pain or suffering

always exaggerated. Allowance must be made for such, therefore, and their representations be largely discounted.

Residence must also be taken into account. There are many cases in which persons coming from a malarial district, though free from any miasmatic manifestations while remaining at home, yet, on leaving such localities and undergoing important operations, are seized with chills, the occurrence of which, were the factor of resistance not recognized, would excite the gravest apprehensions. Persons living in damp basements or in crowded apartments, imperfectly ventilated and shut out from sunlight, with the usually accompanying factor, defective food, when becoming the subjects of disease, present phenomena quite unlike those who live under opposite sanitary conditions.

Seasons of the year bring with them particular forms of disease. The exposure which in summer results in an ordinary catarrh of the lungs, in the spring or winter cause a pneumonia. The same indications in diet which in winter terminate in a simple diarrhœa, would in the summer result in a dysentery.

Social Conditions.—Inquiries in this directions are often of a very delicate nature, and require considerable tact. Yet, it is just here where patients should be frank; and it may be said that when they are made to understand that such interrogations are not dictated by motives of curiosity, and that their confidence will not be abused, no information of importance will be held.

Information derived from Independent Sources.—There are circumstances in which it is impossible to ascertain from the patient the cause of his condition, the knowledge of which cause may be essential to a correct diagnosis, and when outside testimony alone can furnish the necessary information. For example, a man picked up in a state of profound coma, with the smell of liquor on his person, might be supposed to suffer only from extreme intoxication; but if a bystander can testify to having seen the same individual thrown from his horse or his carriage and fall upon his head, all obscurity will be cleared way. An individual while intoxicated receives a blow at the root of the ear and shortly after is affected with facial paralysis. He is unable to give any history of his case, and as paralysis of the portio dura is usually due to a central lesion, the prognosis would necessarily be discouraging. If, however, a disinterested spectator testifies to having witnessed

local violence, the whole aspect of the case will be changed. In convulsive seizures, accompanied by unconsciousness, it is only through the information of a second person that the physician can ascertain those details which will enable him to properly interpret the nature of the attack.

THE TESTIMONY OF THE SENSES.

The knowledge which is acquired by impressions made upon or through the organs of special sense is particularly valuable. There is a natural conformation or expression peculiar to every portion of the body. The corresponding portions of the two sides of the human frame are in health symmetrical. When asymmetrical, it will be detected at once by the trained eye. Thus, the flattened shoulder and the prominent acromion reveal a dislocated humerus; a deviation of the spinal column means lateral curvature; a posterior projection of one or more of the vertebral spinous processes reveals Pott's disease or angular curvature; the absence of the gluteo-femoral crease suggests disease of the ileo-femoral articulation; eversion of the foot, with shortening of the limb, point to fracture through the neck of the thigh bone; and the flat, expressionless side of the face in facial paralysis, are only a few of the many examples which might be cited showing what deductions can be drawn from the loss of symmetry.

Alterations of the Surface of the Body also become tell-tales,—the inguinal scars which follow suppurating glands produced by syphilis; the depressed cicatrices which follow the healing of old bone sinuses; the enlarged veins which cover the surface of suspicious tumors; the bursal swellings which appear in the course of the tendons or over the patella.

Disease has its physiognomy also. There is the timid look, the furtive glance and the downcast eye, following in rapid succession, which betray the practice of secret vices; the sudden strabismus in certain intracranial inflammations or congestions; the dilatation of the pupils in cerebral compression; the contraction of the pupils peculiar to opium poisoning; the spasm of the orbicularis palpebrarum muscles in strumous ophthalmia; the sardonic grin in tetanus; and the pinched, contracted, wasted, hippocratic face which presages approaching dissolution.

Posture or Attitude.—There is something very significant and

instructive in the attitude or position of the body, or of certain parts of the body. The dorsal decubitus and the flexed lower extremities reveal peritoneal mischief; the position of the chest and abdomen point to intestinal colic; the semi-recumbent posture suggests dyspnoea from pulmonary or cardiac disease; the head thrown back in order to call into action the extraordinary muscles of respiration implies tracheal obstruction, as in croup; the leg advanced, somewhat flexed and everted, point to incipient coxalgia; a child who walks with a studied gait, the shoulders being drawn up, and the arms hanging by the sides, will at once arouse a suspicion of spinal caries; a person habitually supporting the entire weight on one limb (the body being inclined to the same side so as to suspend the opposite extremity as it were) is probably suffering from a sacro-iliac disease; the arm after an injury being flexed and supported by the opposite hand, the head being inclined to the damaged side, is an ordinary posture in fracture of the clavicle; and the sick one who is constantly slipping down on his bed betrays a dangerous debility.

Mensuration.—Simple ocular inspection is not always sufficient to detect or to estimate moderate departures from symmetry. Hence it becomes necessary in many instances to resort to measurement with the tape line, the lead ribbon not being elastic and consequently not the best instrument for making accurate measurements. It is by the use of these lines that we are able to estimate definitely in fractures and dislocations the length of the limbs as compared with the sound one. In all such measurements it is necessary, in order to obtain accuracy, that the points between which the tape line is extended, should be as much as possible the salient ones of the skeleton on account of their invariability or fixedness; as, for example, the anterior inferior spinous process of the ileum and the internal malleoli in fractures of the thigh; the trochanter major and the tuber ischii in femoral dislocation and fracture; the acromion process of the scapula, the condyle of the humerus and the olecranon process of the ulna, in fractures and dislocations of the elbow-joint. The plumb line will be found useful in estimating any deviation from the perpendicular; and with a view to obtain a correct outline of the vertebral column, a strip of malleable metal pressed firmly against the spinous processes will accomplish the purpose.

Form and Location.—The surgeon acquires no small amount of information by observing the form or outline of different parts. Thus, a swelling under the jaw, the limits of which are the digastric muscle below, the lymphatics of the chin in front, and the anterior border of the sterno-cleido muscle posteriorly, means decrease beneath the deep fascia,—that is, in the region occupied by the submaxillary gland; a swelling inside of the femoral blood-vessels, oblong or spherical, suggests a femoral hernia; while one external to the same vessels will probably prove a psoas abscess. A pyriform enlargement of the scrotum is characteristic of hydrocele; an elongated or lobular one belongs to hernia. A swelling bounded by the limits of the patella will differentiate a housemaid's knee from other enlargements about this articulation; the synovitis of the elbow-joint, the enlargement on either side of the tendon of the triceps muscle; and in similar disease of the radio-carpal joint, the swelling confined to the dorsal aspect of the articulation.

Color.—This constitutes another valuable aid to diagnosis. There is a brilliant scarlet color belonging to acute inflammation, and the dull, mottled red characteristic of chronic inflammation. In striking contrast is either of the above tints with the dusky brown-red which belongs to phlegmonous erysipelas. The purple, the claret, or the lilac color is peculiar to malignant growths. In pneumonia a dark-red strip of color often extends from the face across the nose, and in pulmonary tuberculosis there is a bright flush on the cheek. A similar dash of color in the latter belongs also to the hectic of chronic suppuration or cold abscess. In constitutional syphilis the copper-colored stains betray the patient; in the constitutional infection of carcinoma and sarcoma the face puts on a dirty, sallow aspect; in suprarenal disease, the skin assumes a gray, leaden color; and in cases of great embarrassment to the respiratory function we have blueness of the face and lips. Then there are alterations of color due to stagnation of blood in the veins and also to extravasation. When appearing after contusions causing dark purple, yellow and green tints, we have ecchymoses; but when deepening into a dark purple and finally black color, with vesication of the surface and diminished temperature, then mortification is in progress. There is a discoloration which makes its appearance several days after injuries, which comes from the deep vessels of a part, and should always, in case the violence is

attended with disability of a limb, induce the surgeon to suspect the existence of fracture.

Translucency.—By the transmission of natural or artificial light, the surgeon is able to solve in a few minutes many cases which otherwise would be obscure. In a dark room and by means of a candle or taper, held on one side, the observer being on the opposite with the edge of the open hand above the suspicious swelling to interrupt the superior and confusing rays of light, we are able to diagnose hydrocele from scrotal hernia, hæmatocele, enlarged testicle, meningocele, and other cysts containing more or less transparent liquid contents.

Movements or Peculiarities of Gait.—He is a very obtuse observer who will not recognize incipient disease of the spine by the mechanical and studied manner in which the child slides its feet along, or who fails to suspect, in reduced activity on one side of the chest and the increased movements of the other, fracture of the ribs or collapsed lungs; who overlooks disease of the heart or lungs, notwithstanding the chest walls in their rapid expansion and contraction are making the revelation. Then there are involuntary movements from failure of coördination; the oscillatory eyeball in nystagmus, spasms and tremors from cerebral irritation; imperfect movements when a limb is hitched along in its entirety, from paralysis; ill-directed movements, as in ataxia; and again those aimless movements which betoken approaching dissolution in low fever, in which the patient picks at the bed-clothes or is constantly catching at imaginary objects in space.

KNOWLEDGE OBTAINED THROUGH THE SENSE OF TOUCH.

By the touch an immense amount of practical knowledge is acquired. We learn therefrom consistency, sensibility, weight, movement and temperature of a part. By passing the fingers over a growth, its geometrical form can be learned; for example, the lobulated masses of a fatty tumor, the irregular knobbed outline of a hard carcinoma, the lenticular shape of lymph glands, and the oblong body of the epididymis, with its great and small globes. In the same manner internal organs can be recognized by the form, even though the abdominal parietes, as that of the kidney, the spleen, the uterus, ovaries, gall-bladder and the fœtus in extra-uterine pregnancies.

Consistence.—As regards consistence, the resistance furnished by a part subjected to skillful touch conveys different impressions according to the underlying material. When the latter is liquid it is fluctuating, as in abscess; when it is doughy, it may be accumulations of fat, as in lipoma or omental hernia; when elastic, it is probably soft carcinoma or sarcoma; a joint filled with granulation tissue imparts sensations of elasticity; if extremely hard, it is characteristic of scirrhus or fibroma. In inflammatory swellings of a serous character, the parts are quite compressible, the contents easily displaced, the pressure leaving a temporary indentation or pitting; when fibrogenous and cell elements prevail, the swelling is firm, indurated as in the soft parts circumscribing an abscess.

Weight has a certain diagnostic import. A tumor which is very heavy in proportion to its size, such as often develops in the mammary gland or the testicle, suggests the idea of malignancy; one which is quite bulky and yet almost floats when touched is likely to consist of fat, as in large lipoma; or of fluid, as in hydrocele.

Mobility.—The degree of mobility which a swelling allows constitutes another significant aid in diagnosis. Fixedness in a new growth is a suspicious condition. Sarcoma springing from periosteum, bone or muscle admit of little motion; a dislocated limb is less movable than a broken one; a joint rendered immovable by muscular action points to inflammatory changes involving one or all the components of the articulation, as in strumous disease of the hip, ankle, elbow or wrist-joint. Increased lateral movements in a glenoid joint belong to arthritis.

Temperature.—The hand alone is sufficient in many cases to determine an increase in the temperature of a part, though the test is inadequate for ascertaining the exact degree of heat. This can only be measured by instrumental appliances, as the clinical thermometer or the thermo-electric battery.

AUDITION.

The organ of hearing is the medium through which an immense amount of information relating to disease reaches the mind. By the ear the surgeon detects the crepitus of fractures and distinguishes it from the moist sound of inflamed sheaths of

tendons or of bursa; and by the ear he gets the clink of a sound when successfully exploring the bladder for a stone,—a sign far more valuable than any sensation received by the hand which moves the instrument. The use of an instrumental appliance like the stethoscope constitutes a successful aid to the ear by concentrating and intensifying the normal and abnormal sounds. In the use of the organ of hearing for diagnostic purposes, it must be remembered that it admits of very great cultivation. It is not only necessary that the hearing shall be very acute, but that the proper interpretation shall be made of what is heard.

OLFACTION.

By the sense of smell the surgeon will discover from the odor arising from the secretions of the mouth the existence of necrosis of the maxillæ. Catarrhal disease of the nasal air passages is detected in the same way before any exploration whatever is made of these parts. A stereoraceous vomiting or fistula may be known in the same way. Pyæmia often reveals its existence by the sweet or fresh hay odor which emanates from the breath of the patient. Alterations in the chemical constituents of the urine can be discovered by the smell, as also those changes which the soft parts undergo in mortification.

EXAMINATION OF THE INTERNAL ORGANS.

No prudent surgeon thinks of making an exhaustive diagnosis or of undertaking an important operation without interrogating the various internal organs of his patient.

Circulation.—The heart and the blood-vessels are to be examined, taking into account the frequency of beats, the force, rhythm and sounds of the organ. Since the introduction of the clinical thermometer, the pulse has, with many, lost much of its importance as a factor in the diagnostic problem. The particular points to bear in mind in the study of the pulse, are its force, volume and regularity. As there is no exact standard of pulse beat, each individual subject must be considered independent of all others. Even in the same person the throb of the artery varies at different times, influenced by reflex, functional and organic causes, by position, exercise, emotion, food and personal idiosyncrasy. Even the presence or the looks of the medical attendant may

disturb the circulation. In females and in children the heart and arteries are quicker than in males and adults. In view of these facts the wise physician will always, before commencing his examination, manage to place his patient at entire ease by some general remarks entirely irrelevant to the work at hand.

In all infradiaphragmatic inflammations the pulse is generally hard or cord-like, whilst in those inflammatory diseases met with above the diaphragm the reverse is the case, the pulse being full and bounding. In compression of the brain the pulse beat is full and slow; in concussion it is feeble and frequent, much the same as in shock. The feeble or the fatty heart is often revealed in the drop of a beat at intervals of six or eight pulsations. After exhausting hæmorrhages it is common to note a peculiar sharp, tremulous and jerking sensation as the blood flows through the artery. The pulsation of the artery is often changed in its rhythm, intermittent, irregular or dicrotic, indicating gastric disturbance or cardiac disease. A very rapid pulse, or one habitually frequent, indicates danger; it is met with in pulmonary tuberculosis. In compression of the brain, when the pulsations of the heart from having been slow become rapid, a fatal termination is approaching.

Respiration.—All deductions drawn from the respiratory movements must be based on their frequency, ease and regularity. When impediment to breathing is present, whether the difficulty is connected with inspiration or expiration, and the effect of all such disturbances on the walls of the chest, abdomen, or on the voice. Whatever interferes with the expansion of the lungs will necessarily increase the frequency of respiration, and the hinderance may be intrinsic or extrinsic: the former when the parenchyma of the lung becomes infiltrated with an inflammatory exudate, as in pneumonia; the latter in cases of hydrothorax, pneumothorax or hæmothorax, when the lung is pressed back toward the spine by an accumulation of serum, air or blood in the pleural sac. In either case the pressure prevents the free access of air into the air cells, in consequence of which there is an attempt to compensate for, on the part of nature, the diminished æration of blood by numerous sharp respiratory acts. The effect of cardiac disease on the respiration is worthy of note. In obstructive conditions, as in croup or œdema of the glottis, the breathing is stridulous and noisy, and most marked during inspiration. The same is the case where the

obstruction is not pathological, but purely mechanical, as when a bolus of food becomes arrested at the juncture of the pharynx and œsophagus and presses against the trachea. In pleurisy and in pleurodynia, the inspiratory act will be brought to a sudden stop before being half completed; and in like manner will the chest movement be arrested before half expanded after a broken rib. There is something very interesting in the interchangeableness of function which exists between the thorax and the abdomen. When the ribs are broken, the walls of the chest on the fractured side become almost motionless, the diaphragm and the abdominal muscles taking up the work of respiration with increased activity. In peritonitis the walls of the abdomen become quiet, to give rest to the inflamed membrane, the parietes of the chest supplementing the deficiency by more extended movements.

In case of intracranial pressure the breathing is slow, labored and noisy. There is a short, grunting respiration often observed in children and which should always awaken a suspicion of disease of the vertebræ. In that peculiar breathing styled the Cheyne-Stokes respiration, we have an important contra-indication against operative measures in intracranial disease. The inspiration will often be more impeded than the expiration, and this always points to mechanical obstruction in the larynx or trachea. This is witnessed in œdema about the vestibule of the larynx, in croup and in morbid growths which develop about the vocal cords. There are alterations in the voice sounds which have their significance; these are usually associated with the inspiration in which stridor, crowing and wheezing are heard. Inarticulate mumbling of words and guttural sounds are present in tonsillitis and in post-pharyngeal abscess; and in paralysis of the vocal cords, or extreme debility from exhausting disease, the voice is reduced to a whisper and is delivered in a tremulous tone.

The peculiar tracheal râles made by the air passages through the mucous secretions, and heard both during inspiration and expiration, are usually precursors of death. Not infrequently the surgeon uses the respiratory function to assist in diagnosing certain enlargements,—for example, the cough, to bring out the impulse which shall be felt by the hand grasping a hernial tumor, or the rise and fall of the liver when the enlargement involves that organ. Nor must be overlooked the influence of emotional causes on

respiration, as the sudden inspiration in pain, the short, hurried breathing of joy, the long-drawn sighs of sorrow or melancholy.

NERVOUS SYSTEM.

The phenomena which belong to disturbances of the nervous system are often of the most perplexing and embarrassing nature. To separate the real from the fictitious is not always an easy task. The inquiry must comprehend intellectuality, motility, sensibility.

Intelligence.—Disease or injury may change both the mental and the moral condition of a patient. Great arterial excitement, especially in children and in aged persons, is commonly attended by some muttering mental delirium. The incoherent low muttering delirium belongs to fevers of a low grade, and is the outcome of a blood unfitted for the nutrition of the brain; while the wild or maniacal raving indicates meningitis or cerebritis. There is a traumatic delirium which always presages danger. Often the intelligence is obtuse, dull, somewhat difficult to wake up, but clear when aroused, relapsing again into a lethargic condition when questions are answered. Such often is the state of a patient suffering from uræmia, typhoid fever or concussion of the brain. In compression of the brain there is complete suspension of intellect. In all cases where mental hebetude passes into stupor and finally into coma, there is serious intracranial disease, which betokens a fatal termination. There is a curious form of delirium which the editor has noticed after operations for cataract in old persons, evidently to be attributed to some unusual impressions transmitted from the eye to the brain. The patient is constantly endeavoring to remove the dressings, can with difficulty be kept in bed, and believes him or herself absent from home; yet is entirely rational in replying to questions in conversation. Another form which the mental disturbance assumes is that of hallucinations,—often of a horrid or frightful character. The delirium of drunkards is of this nature. The moral phenomena, like the intellectual, are curiously influenced by physical disease: for example, the irritability incident to chronic maladies, the profanity exhibited in some cases of concussion of the brain, as also the obscenity accompanying nymphomania. To these may be added the protean eccentricity witnessed in hysteroid patients.

Sensation.—Inquiries under this head include the sensibility

of the skin, of the mucous membrane and the muscles. The normal or abnormal state of the skin in this particular may be tested by the touch and by the æsthesiometer.

Electro-galvanism is used for testing muscular sensibility and contractility. There are certain poisons circulating in the blood, as that of syphilis, which lessen the sensibility of the skin. Mechanical and pathological conditions affecting nerve trunks frequently give rise to numbness. Cutaneous sensibility may, on the other hand, be excessively exaggerated, the gentlest touch in some instances provoking most unusual symptoms of suffering. Such demonstrations are witnessed in females with hysterical or pseudo-inflammatory joints, or who have fictitious spine disease. Abnormal sensibility exists in a great diversity of ways. Poisoned wounds (dissecting, for example) are usually disclosed by an intense and painful sense of itching; parasitic diseases are attended by itching; jaundice causes a similar state. Disorders of the spinal cord or nerves often give rise to most singular disturbances of common sensibility. These are compared by the patients to a feeling like that produced by ants crawling over the surface, the stinging of nettles, localized heats, cold currents of air rolling over the surface. Some portions of the body naturally devoid of sensibility will become acutely sensitive through the agency of inflammation. The healthy peritoneum can be handled without a patient being conscious of the contact; but when inflamed the tenderness becomes excessive. The gums, antecedent to dentition, are almost devoid of feeling, yet when inflamed are capable, through extreme sensibility, of causing convulsive disturbance of the whole muscular system. The hard, callous, insensate integument of the the heels becomes extremely painful if inflamed.

Reflex Sensibility.—A careful study of reflexes, superficial and deep, have rendered most important service in the diagnosis of affections involving the spinal nerves, the cord and the brain. When reflex actions are present, it is an evidence, at least, that the reflex loops through which they are produced are not diseased, and that the path through the cord, which, though it might not be perfect, is at least not interrupted. In this manner, by testing the plantar, gluteal, cremaster, scapular and other reflexes, we are able approximately to determine the state of the different sections of the spinal cord. Thus, impairment of the knee or patellar tendon

reflex means something wrong with the reflex loop at the level of the second or third lumbar nerves, or with the posterior column, as in locomotor ataxia, etc. On the other hand, the reflex of the knee-tendon may be greatly exaggerated in one or both sides in descending degeneration of the cord, commencing high up. Of vast importance are these reflexes in separating real from hysterical disease. Take, in illustration, the imaginary weakness sometimes claimed for the legs if pressure or a tap on the sole of the foot excites the ankle clonus,—a positive evidence of organic disease of the cord. The hysterical origin is eliminated at once.

Pain.—The proper interpretation of pain comprehends its character, its location and its duration. Burning pains belong to inflammation of the skin; throbbing pain characterizes abscesses formed under resisting structure, as in whitlow; darting or shooting pains accompany malignant tumors; gnawing or boring pains are present in bone disease; sickening pain is experienced in contusion of the testes. Pain is not always felt at the seat of disease. In coxalgia, the patient often refers his pain to the knee; in vesical calculus, the suffering is realized near the end of the urethra; and in hepatic affections, a favorite seat for the pain is at or near the inferior angle of the shoulder-blade. The duration of pain has its significance. When constant, the nerves are subjected either to inflammatory deposits or to the pressure of morbid growths; when intermittent, it is neuralgic in character. Fugitive pain may be either neuralgic or rheumatic. A fixed, persistent pain, one which does not change its position, should always receive the constant attention of the physician. In estimating the severity of pain, allowance must always be made for temperament. What one person would endure without complaint would cause in another, with a highly sensitive nervous system the most extravagant exhibitions of suffering.

Motility.—Muscular movements furnish another suggestive means of diagnosis. The power of muscles is determined or measured by the dynamometer. Eccentric movements of muscles may depend on central causes,—that is, on disorder of the masses of neurine from which emanates their energy; on transmitted peripheral irritation; on the state of the nerves which enter into their substance; on degeneration of the sarcois cells. Under the first head come the cases of coördination seen in ataxia: of rigidity

following sclerosis of the cord; of weakness and atrophy, as in infantile paralysis; tremors, as in paralysis agitans and of chorea. In testing for the integrity of the nerves which supply groups of muscles, the faradic and voltaic currents become important, as it is found that when degeneration of nerve trunks occur, though in the early stage of such changes, then voltaic irritability may be increased; yet soon they fail to respond to either faradic or voltaic currents. Loss of power in certain groups of muscles may also result from mechanical causes, as the pressure of a tumor or an inordinate deposit of callus after fracture. Here there is no degeneration of nerve tissue, the conduction only being interrupted, and when this interruption is removed the function is restored. Muscles may become temporarily paralyzed by exacting demands on their energy, or from prolonged and severe action, as the spasms of muscles is often reflex, originating in a local irritant, as an inflamed gum, a spiculum of bone or some gastric derangement; the physician must not confound a peripheral with a cerebral excitation. Knowledge of cerebral localization has also assumed deserved prominence in diagnosis,—the centres of motion giving energy to the various groups of muscles having been well made out, being grouped about the fissure of Rolando, and having a definite relation to the exterior of the cranium, so that the surgeon well instructed in cranial topography may now carry his explorations into regions which hitherto were deemed unapproachable.

Another form of muscular weakness, neither due to central disease or to disease of the nerves, is due to fatty degeneration, the sarcous elements being replaced by fat. This change may be the effect of inflammation, of arterial degeneration, or of disuse. From the foregoing suggestions it will be perceived that phenomena bearing very close resemblance may be determined by diverse and widely separated causes, demanding for their proper solution not only a thorough anatomical and physiological knowledge, but also the ability to use those instrumental resources without which he would be unable to reach a correct diagnosis.

DIGESTIVE APPARATUS.

The tongue furnishes a valuable index to both local and general disturbances of the system. When the secretions of the organs are arrested, as during febrile movements, it becomes dry;

a red, dry and glazed tongue indicates gastro-intestinal irritation; a dark tongue with very prominent papillæ occurring in the course of traumatic fever betokens danger. The form of the tongue is another feature of importance. In old cases of chronic indigestion it is quite common to find it broad and fissured and with rounded borders. In the early stages of meningitis or cerebritis it will be long, narrow and pointed, and in laryngitis or trachitis it is at times concave, being depressed in the centre and elevated at the sides.

Deglutition and articulation, when not properly executed, will suggest a careful examination of the fauces and the pharynx for enlarged tonsils, elongation of the uvula, hypertrophy of the pharyngeal glands, post-pharyngeal abscess from disease of the cervical vertebræ, and post-nasal polypi. If there be any reason for suspecting stricture of the œsophagus, based on difficult or painful deglutition or regurgitation of food, the use of œsophageal bougies will be required to establish the diagnosis. Stricture is often simulated by hysterical persons; but the use of the bougie will clear up any obscurity on this point.

Vomiting, when present in persons who are the subjects of chronic indigestion, should always lead the surgeon to make a careful examination of the abdominal viscera for possible growths, especially about the pylorus. Acute vomiting, with or without pain, demand a similar course, examining with particular care the hernial passages for concealed hernia. When the matter ejected is stercoraceous, a condition readily recognized by the faecal odor, the question of mechanical obstruction may be regarded as settled. Generally, unless the abdomen is loaded with fat, the outlines of the glandular organs can be so accurately traced by percussion and manipulation as to be recognized through the parietes. In making these examinations there are certain surface features which must not be overlooked; such as enlarged, often varicose, subcutaneous veins indicating obstruction to the circulation in the deep venous trunks; so likewise the form of the flanks, whether flattened or prominent, the former being an usual condition in ovarian cysts and the latter in ascites. In all doubtful cases of morbid growths within the abdominal cavity, a laparotomy is the best way of reaching an accurate diagnosis.

The discharge of blood from the rectum, depending as it does

on a variety of causes, as hæmorrhoids, carcinoma, stricture, and ulceration, can only be traced to its proper source by digital or instrumental examinations. The form of the fæces when extruded will often disclose the nature of the disease; thus, in stricture the dejections assume different shapes, sometimes resembling small, round cylinders like pipe stems or lead pencils, at other times coming away from the bowel in broken pieces, flat or triangular in shape. In hypertrophy of the prostate body, the fæces not uncommonly have a grooved appearance.

Tenesmus is another symptom demanding attention. It may depend on colitis, in which case there is usually mucus, stone or mucus and blood mingled with the fæces, if any such are discharged. It may also be induced by a foreign body in the rectum; and when accompanied by frequent and small or watery passages from the bowel, fecal impaction should at once be suspected. Pain in the bowel may be due to hæmorrhoids or to fissure. When caused by piles, it is experienced at the time of defecation; when from fissure, it does not set in until ten or fifteen minutes after an evacuation.

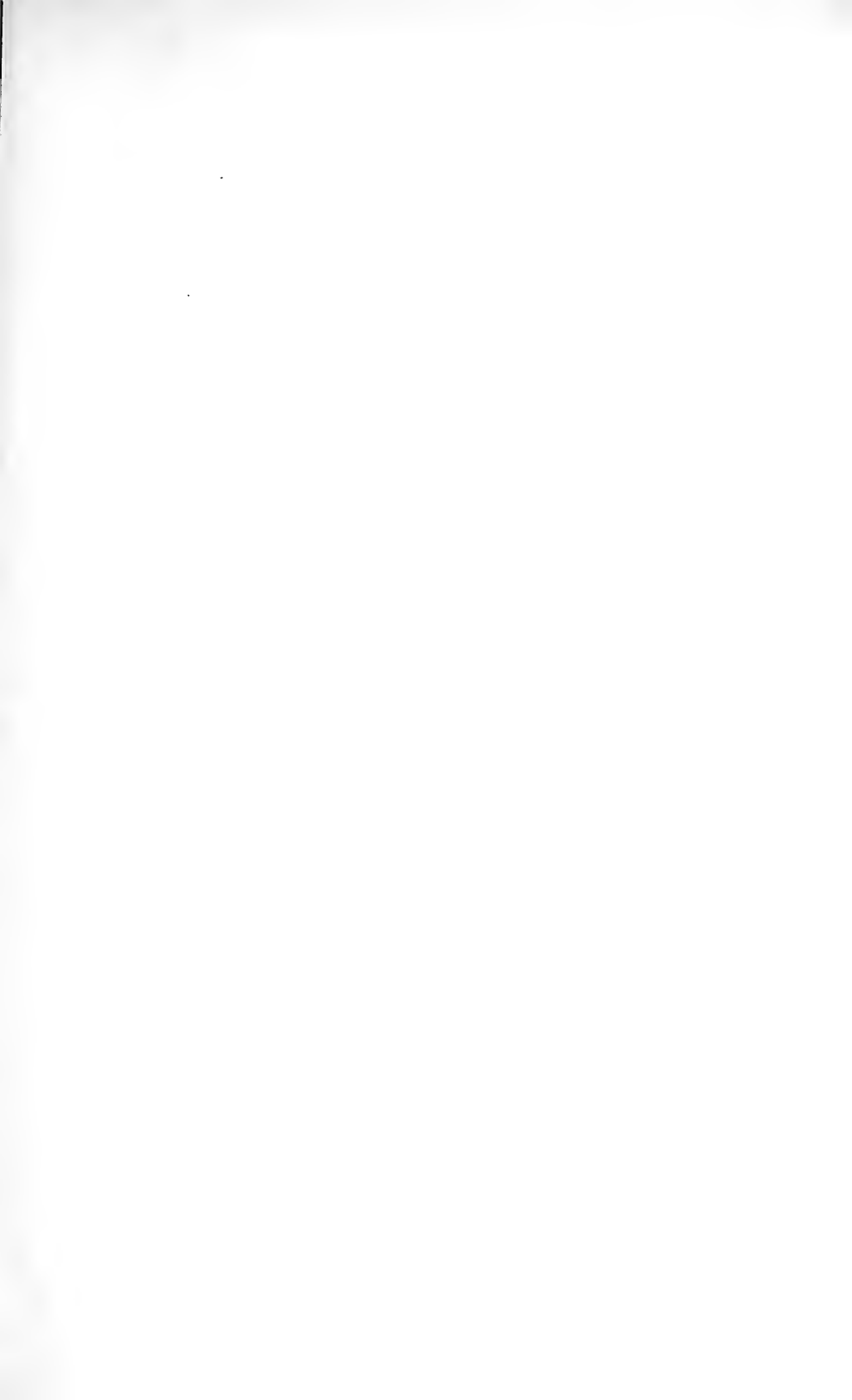
GENITO-URINARY SYSTEM.

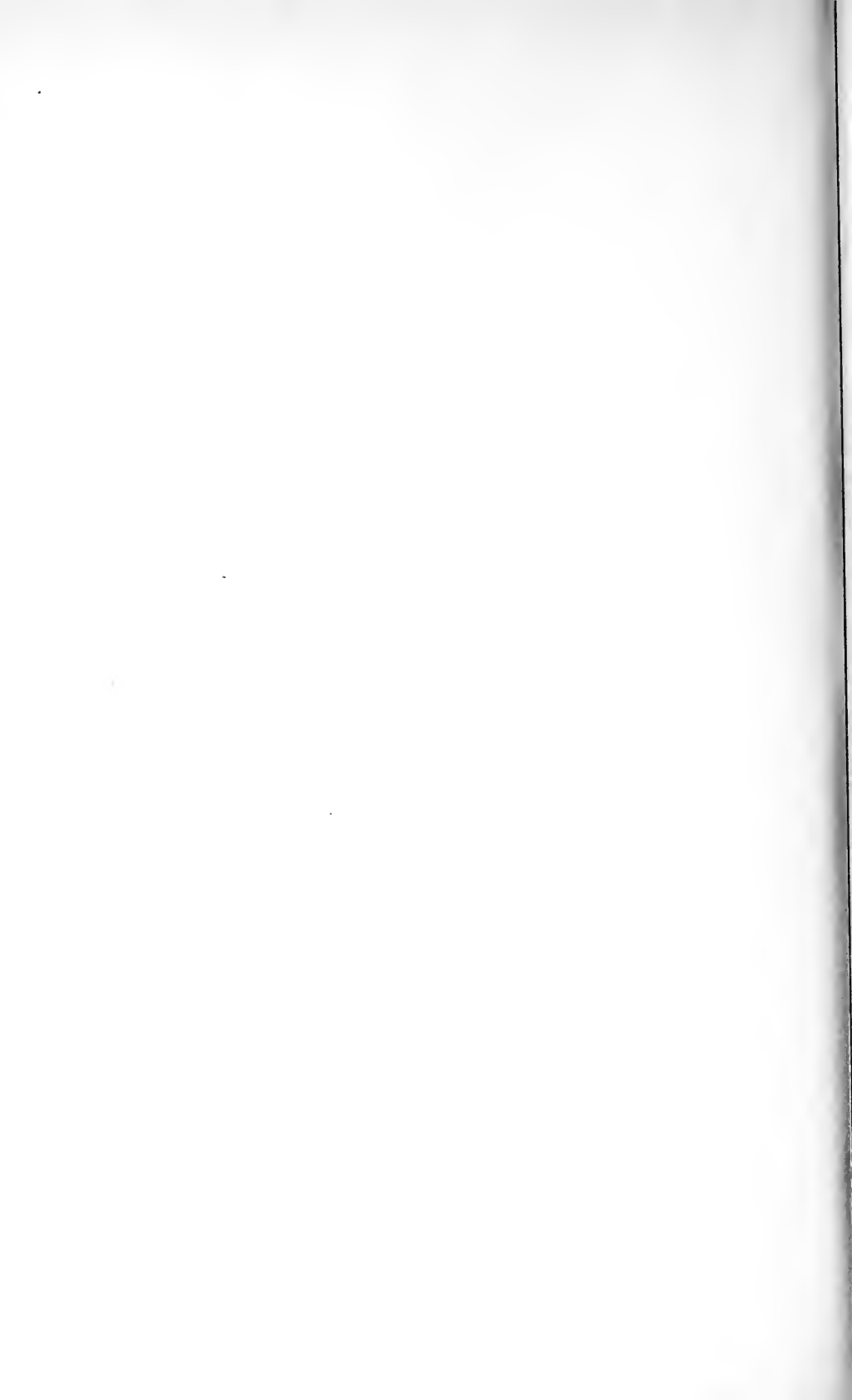
In both males and females the sexual system plays a very prominent part both in the moral and physical economy, in health and disease. Under this head comes a train of perplexing troubles, as seminal emissions, impotency, masturbation, priapism, disorders of menstruation, urethral discharges, irritable bladder, cystitis, urinary calculus, stricture, renal colic, phimosis, prostatic disease, etc. The diagnostician is compelled here to traverse a broad field of inquiry, in consequence of the extended chain of sympathies which blend the different parts of this system. Spermatorrhœa, for example, may arise from incontinence or from venereal disease, from certain conditions of the urine, or from central disease; and when a young person without any evidence or organic disease complains of palpitation of the heart, restlessness, dyspepsia and loss of strength, the condition should be suspected.

Impotency may result from excessive indulgence, or from constitutional syphilis, from oxaluria, from disease of the spinal cord, and from numerous other causes. Each in turn require to be considered before reaching a conclusion. Disorders of the menstrual function, as dysmenorrhœa, amenorrhœa and menorrhagia, demand

instrumental examination, as the causes of these disorders cannot be ascertained with a degree of certainty in any other manner. The influence of the climacteric period on female health must not be minimized as one element in morbid disturbances of the sex when approaching the menopause. But especially should the vaginal discharges be examined. Any pale, red, watery or chocolate-colored fluid, especially if attended with odor, means serious mischief.

Priapism, when present, is suggestive of spinal, cerebral or cerebellar disease. Pain along course of the ureter, with retraction of the testicle, point to renal concretions; and when culminating in a paroxysm of colic, usually implies the passage of a stone along the ureter from the kidney to the bladder (nephritic colic). In investigating a case of bladder disease considerable ground has to be traversed,—as the frequency of urination; the character of the stream, twisted or forked, small or large, continuous or interrupted; the nature of the deposit, if any, in the urine, and the character of pain, when present; dull or acute, when experienced, at the commencement or termination of the urination, at the end of the penis, at the neck of the bladder, or along the entire course of the canal, and the condition of the prostate body. Condition of the prepuce will also form another point for consideration in connection with the urinary incontinence of children, in balanitis, epilepsy and disturbances of muscular coördination. As any surgeon knows the value of sound kidneys to the success of an operation, he will never fail, before undertaking any important surgical procedure demanding the use of the knife to examine the state of the urine. This examination, to be thorough, should include the physical, chemical and microscopical characteristics of the secretion. Albumin, blood, pus, muco-pus, urates, phosphates and oxalates, depending, as they do, each on many causes, must all be traced to their proper region, if the diagnostic problem is to rest on a substantial basis.





STORAGE

